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An Exploration of Performance-Based Funding at Four-Year Public Colleges in the North Central Association of Colleges and Schools

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An Exploration of Performance-Based Funding at Four-Year Public Colleges in the North Central Association of Colleges and Schools

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Abstract

Performance-based funding has been used to help alleviate state and public calls for higher education accountability and more states have adopted this type of funding model (Tandberg & Hillman, 2014; Dougherty, Natow, & Vega, 2012). The purpose of this study was to explore performance-based funding and examine the relationship between types of funding and performance indicators in the North Central Association of Colleges and Schools (NCA). The state funding trends were examined for all of the states in the NCA. The correlations for state funding and four performance outcomes for all four-year higher education institutions were compared for three states with performance-based funding and three states with incremental funding. The study also created regression equations within each type of funding to predict full-time retention rate and four-year graduation rate. This study found statistically significant correlations between state appropriations and all four performance outcomes examined regardless of funding model utilized.

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I. Introduction

Public funding has increasingly become an issue for higher education institutions. As budgets grew and institutions became more complex, state allocations became a smaller portion of operating budgets. With this decrease in financial support, states had to find ways to maintain their influence on institutions in different ways, including the creation of accountability measures to assure that institutions took care of their students and responded to state priorities or concerns. One way that states specifically sought accountability from higher education institutions was through the creation of performance indicators tied to funding (Watt, Lancaster, Gilbert, & Higerd, 2004; Cavanaugh & Garland, 2012).

Several states have implemented performance funding models since 1979. Tennessee began the movement by implementing performance funding and continuing to use it, but it has gone through several revisions (McLendon, Hearn, & Deaton, 2006). The Tennessee funding model predates most other versions of performance funding by at least a decade. Performance-based funding was adopted in a large number of other states during the 1990s. By 2003 there were 25 states that used some form of performance-based funding (McLendon et al., 2006).

Performance-based funding appeared to be the answer to higher education accountability; however, by 2010 almost half of these funding systems were abandoned (Dougherty, Natow, & Vega, 2012). Examining all of the different positive, negative, and confounding aspects of this funding can help to shed light on the reasons that many of the models were either kept or abandoned. Performance-based funding influenced colleges to linking performance goals to their institutional missions and goals, but it also had serious drawbacks (Sharma, 2004; Zarkesh & Beas, 2004).

The main drawback of performance funding was its inability to influence what it was designed to impact. Many studies have indicated little to no statistical significance of the effect of performance-based funding on outcomes, as institutional characteristics have been more predictive of these outcomes (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). Some researchers feel that focusing on outputs can lead to a degradation of academics, as teachers and researchers would be called upon to sacrifice quality in order to attain a particular performance outcome (Frolich, 2011; Liefner, 2003).

Many of the funding models implemented have focused on a very small number of performance indicators, while other institutions focused on too many indicators. South Carolina, for example, used 37 different indicators, and that led to a cessation and subsequent restructuring of their performance-based funding model (Watt et al, 2004).

The amount of state funding available also served to weaken performance-based funding, as some states did not offer enough of a financial incentive to make the process desirable (Sanford & Hunter, 2011). In many cases, states did not follow through with the models as they were originally designed, as some institutions resisted the new funding mechanisms (Shin, 2010). The recession and availability of money in the early part of the twenty-first century also hampered the effectiveness of many fledgling performance funding models (Dougherty et al., 2012).

Another factor that can influence performance outcomes is a funding model composed of both performance and nonperformance funding components. Shin and Milton's study (2004) showed a statistically significant increase in graduation rates when both types of funding components were used, resulting in a stronger desire to construct and implement composite and complex formulas.

Despite the starting and stopping of model use, not all performance-based funding models have been abandoned. Many of these models have been revised and persisted, including the Pennsylvania model (Cavanaugh & Garland, 2012). The national need for accountability in education is also a major influence on the continued use of performance-based funding, and the increased desire for accountability is leading more states to consider performance funding, including Indiana, Texas, and Louisiana (Sanford & Hunter, 2011). With the renewed interest in performance-based funding, an understanding of these funding models and exploration of their effectiveness are important.

Statement of Purpose

The purpose for conducting the study was to explore performance-based funding and examine the relationship between types of funding and performance indicators in the North Central Association of Colleges and Schools (NCA). The NCA was used for several reasons. There are 19 states in the NCA, so it has a large proportion of all states. The funding of education in the NCA has remained relatively flat despite increases in higher education enrollment, which illustrates the need for an examination of funding practices in the NCA. The use of colleges from the same accreditation region also nullifies the influence of different accreditation standards.

Statement of Research Questions

1. What have been the state funding trends during the past five years for public four-year higher education institutions in North Central Association of Colleges and Schools (NCA)?
2. To what extent was there a correlation between performance-based funding and both retention and graduation rates at public four-year institutions in North Central Association of Colleges and Schools (NCA)?

3. To what extent was there a correlation between incremental funding and both retention and graduation rates at public four-year institutions in North Central Association of Colleges and Schools (NCA)?

4. To what extent could the amount of state funding in conjunction with either performance-based funding or incremental funding be used to influence and/or predict increases in both retention and graduation rates?

Definitions

Performance reporting: Institutions are required to provide certain performance indicators to the state every term or year (McLendon et al, 2006). States provide graduation rates, retention rates, enrollment, and other factors to the state in order to provide information to the state and public.

Performance budgeting: Budgeting within a division, department, institution, or other subgroup of an organization is tied to some form of performance expectation. These different entities will use performance indicators to decide what areas need more or less funding. This can also be focused to meet a goal set by the entity.

Performance-based funding: A portion or all of state funding to each institution is tied to improving one or more performance outcome. States set a standard of institutional improvement for an outcome, such as graduation rate, and tie a portion of funding to meeting that standard. Institutions will only gain that money if the standard is met. The amount of funding can be additional funds or be a portion of the yearly funding formula for an institution.

Performance indicators: Variables and/or data are associated with predicting or showing performance at an institution or organization. The variables indicate that an institution has

reached some type of outcome. These include but are not limited to graduation rates, retention rates, and enrollment.

Graduation rates: This is the percentage rate at which undergraduate students graduate with a bachelor's degree. These are often broken into four year and six year graduation rates. The rates are based on the first-time, full-time freshman student who persist and attain a bachelor's degree in a reasonable amount of time.

Retention rates: This is the percentage rate of students who return to an institution for their second year of college. This measures the ability of an institution to retain students from the first to the second year.

Incremental budgeting: A type of budgeting that utilizes the previous year's budget as a template and makes incremental/percentage increases to different areas. For most institutions, this is a method of keeping up with inflation and increases in the cost of upkeep and services. This method works on the assumption that the previous budget was well developed and just needs to be slightly changed to meet the inflation and cost changes (Barr & McClellan, 2011).

Rational comprehensive budgeting: A type of budgeting that examines several different factors to determine the best way to allocate resources. This type of funding is dynamic and changes based on quantifiable data and calculations (Wildavsky, 1974).

Assumptions

General assumptions

1. The study assumed that states were adhering to stipulations of the funding models that they had set forth. States were administering the funding amounts set forth in their models.
2. The study assumed that the North Central Association of Colleges and Schools was consistent in the methods used for accreditation and that the standards set forth were maintained.

The assumptions associated with Pearson Product Moment Correlation.

1. The variables measured were continuous.
2. The data had no significant outliers.
3. The two variables compared had a bivariate normal distribution.
4. The data were from a random sample.
5. Visual graph of two variables being compared had an approximately linear relationship.

The assumptions associated with linear regression.

1. The data were from a random sample.
2. All of the pairs of data had a bivariate normal distribution.
3. Random errors from the regression equation were normally distributed.

Delimitations and Limitations

The study was limited to public four-year institutions in the North Central Association of Colleges and Schools (NCA). This helped to alleviate the effect from accrediting organizations. Each accrediting body had its own standards that are intending to improve performance at institutions. By limiting to one accrediting body, it helped the study nullify the effect on the accrediting body so that the study could eliminate that as an influencing factor. However, this also lessened the validity of the findings for states and institutions outside the NCA.

Within the NCA, three states were chosen for the longevity of their performance funding models. One of the main reasons cited for the ineffectiveness of performance-based funding was that states did not use the program long enough. By selecting states that have had performance funding for five or more years, the study only showed states where the performance-based funding had persisted. This allowed the study to examine five years of data to give a larger sample. This sample focused on only three states with performance-based funding. These states

were paired with three states that did not utilize performance funding to help decrease the effect of the smaller sample size. This allowed for a thorough comparison of incremental funding and performance-based funding over a five-year period. By purposely choosing the states, the study had a wider breadth of data, but it was not a truly random data set.

The study was limited to public four-year colleges to help alleviate the confounding factors that different types of institutions would have. Performance funding is often used in public four-year and community colleges, but the disparate foci of these different types of institutions can affect a researcher's ability to understand the true relationship between funding and performance outcomes. Focusing on four-year colleges can make a relationship easier to identify between funding and performance outcomes, but it makes extrapolation to community college unwieldy.

Theoretical Framework

The theoretical framework for the study was focused on rational comprehensive funding versus incremental funding. The different types of state funding in higher education were linked to the differences between incremental and rational comprehensive budgeting. Incremental budgeting/funding was considered traditional state funding, while performance-based funding was a type of rational comprehensive budgeting (Layzell, 1998). The aspects of both types of budgeting were important to a thorough understanding of the methods used in state funding.

Incremental budgeting involved using the budgeting values used in the previous year and making percentage increases in all areas (Barr & McClellan, 2011). Incremental budgeting assumed that previous budgeting expenditures were correctly proportioned and that the new budgeting can simply be adjusted for inflation or increases in student population. While this provides a stable funding source which shields institutions from violent shifts in funding, it could

have a negative effect on innovation within an institution. If the only basis for funding/budgeting were last year's budget, then there was little incentive for improvements in different areas of an institution. However, incremental funding can make complex funding more easily manageable. This was often used for smaller subsections of the institutions or company, such as a department (Wildavsky, 1986). In this way the budget for the department was normalized and only changes to the normal incremental increases needed to be sent up to the next level in the chain of budget decision making (Wildavsky, 1986). Understanding the full scope of changes across multiple departments was difficult, so the use of incremental budgeting helped to minimize the effect of budgetary changes (Wildavsky, 2001).

Rational comprehensive budgeting relied on different factors to determine funding. Rational comprehensive budgeting compared different possible spending propositions based on the impact on predetermined objectives (Wildavsky, 1974; Wildavsky 1988). This type of funding relies on data and comprehensive calculations. Based on how institutions are performing and other factors, the budget can be cut or increased to adjust for the different factors. This process is a more complex, but it requires a greater accountability from institutions. The greater complexity can make it more difficult for institutions to make long-term funding models because of the possibility of budgetary changes each year.

Both budgeting methods have strengths and weaknesses. For this reason, many states that have implemented rational comprehensive budgeting methods often include some portion of incremental budgeting in their budgeting model (Shin & Milton, 2004). Concentrating on only one type of funding can lead to funding shortfalls and dissatisfaction with the outcomes (Wildovsky, 1988). This creates stability for the institution, but may force institutions to strive for increased performance to increase rational comprehensive funding.

Significance of the Study

Over the past three decades there have been multiple movements and trends of interest by legislators to implement performance-based funding in higher education (Shin, 2010). These pushes have led to a large number of states implementing performance-based funding models, but many of these models were eventually abandoned (Dougherty et al., 2012). Some were abandoned during the late 1990s and early 2000s, but they have recently enjoyed a renewed interest in Indiana, Texas, and Louisiana (Sanford & Hunter, 2011). Several studies have shown little to no statistical significance of the effect of performance-based funding on performance indicators (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). Despite these study results, this method of public funding has kept recurring. With the continued use of performance-based funding models, a thorough understanding of these models and its relationship to performance indicators would be beneficial to policymakers, and institutions.

In the current environment of accountability, performance-based funding continues to be an attractive option for assuring the public and maintaining a governmental influence on outcomes at colleges and universities (Tandberg & Hillman, 2014). Despite its attractiveness, performance-based funding does not appear to have had much influence on performance indicators such as retention rates (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). Most studies have used the existence of performance funding without taking into account the amount of funding provided. One of the biggest factors cited by researchers for the failure of performance-based funding is the lack of financial impact (Sanford & Hunter, 2011). Examining the amount of funding allocated through these models could help to evaluate the impact of performance funding (Sanford& Hunter, 2011). This study used funding values to compare the different aspects of public funding and examine the correlation between funding

sources and performance indicators. These correlations and other statistical information were used to develop a predictive formula that utilized different input variables to predict performance outcomes. The correlations and predictive formula will allow policymakers at the state and institution level to make more informed decisions about the methods of funding and the amount given for each type of funding.

In order for performance-based funding to be effective, it must be adapted to different types of institutions, which have different foci and are not easily comparable across performance indicators (Zarkesh & Beas, 2004; Sanford & Hunter, 2011; Cavanaugh & Garland, 2012). States need to work with different institutions to create tailored performance models, continually evaluating the models in use (Blake, 2006). By focusing on only public four-year institutions, the study hoped to provide a better understanding of performance funding at one specific type of institution.

Many studies have examined performance-based funding. Most of these studies, have examined either one specific state or an assortment of states from all over the United States (Polatajko, 2011; Sanford & Hunter, 2011). This has failed to take into account the influence that different accrediting agencies can have on performance indicators. For example, the Southern Association of Colleges and Schools (SACS) has begun to require improvement in specific performance indicators (Jackson, Davis, & Jackson, 2010). By focusing on NCA, the study helped to negate the possible influencing factor of mandatory performance dictates. The study should provide policymakers within NCA an understanding of the influence of performance-based funding models in their region.

There are many factors that must be considered by policymakers at the state and institutional levels regarding public funding of higher education. Study findings should provide

policymakers a detailed explanation of the correlation between different funding models and performance indicators, and explore the predictive influence of state funding on performance outcomes. This should help state policymakers understand the viewpoint of institutional leaders and to better include these leaders in the development of performance-based funding models.

Understanding better funding methods can help institutions run more efficiently. Policy makers and institutions could benefit from a more efficient funding method that will lead to better performance outcomes for institutions. If the relationship between different inputs and the desired outcomes are better understood, then a mechanism can be devised to help predict the inputs needed to influence those outcomes. Policy makers would be able to fund institutions in a manner that would serve to reach desired outcomes and make those institutions more effective.

The significance of the study was in the overall incorporation of different factors to examine performance-based funding. Few studies have used the actual funding amounts to examine correlations between public funding models and performance indicators. The study also developed a multiple linear regression equation to better predict the effect of funding within both performance-based funding and incremental funding. The significance of this study is in its contribution to the growing body of research involving performance-based funding and performance indicators.

II. Review of the Literature

Mullins Library at the University of Arkansas was the primary source for collecting the materials used for this literature review. Several books were found through the library while others were purchased for extended study. Many of the online sources and printed materials were located using the online search tool. The main search terms used include performance-based funding, public funding, state funding, incremental budgeting, rational budgeting, North Central Association of Colleges and Schools, performance indicators, graduation rates, retention rates, and higher education. Other articles and studies were located using the works cited from the different studies and articles found.

The review of the literature about performance-based funding showed that this type of funding has become more prevalent in state funding in recent years. Beginning in the 1980s and 1990s, accountability became a state focus for colleges and universities (Huisman & Currie, 2004). States began requiring performance reporting, performance budgeting, and/or performance funding to help influence change at universities (McLendon et al, 2006). Throughout the 1990s, many states began adopting performance-based funding models. These models were developed to help states influence increases in performance indicators at institutions. Many of the research on the early models shows little to no influence on performance indicators (Polatajko, 2011; Sanford& Hunter, 2011; Shin, 2010; Shin & Milton, 2004). Almost half of the original performance-based funding models were abandoned by 2010 (Dougherty et al., 2012). Despite the failures of many of the early models, many states are adopting new performance-based funding models.

In order to fully understand the development of performance-based funding, a thorough understanding of public funding of higher education was needed. Public funding of higher

education includes federal and state funding. Federal funding of higher education did not have as much bearing on performance-based, so much of the literature reviewed focused on state funding. A general exploration of performance-based funding was also necessary. Since the purpose was to explore performance-based funding in North Central Association of Colleges and Schools (NCA), it was important to have an overall understanding of the NCA in general and culture surrounding the region.

This literature review included three main sections: Public Funding of Higher Education, Performance-Based Funding, and North Central Association of Colleges and Schools.

A. Public Funding of Higher Education

Trends

American higher education institutions are funded through different funding sources. Both federal and state governments provide support for higher education and are constantly changing. Over the last few decades, higher education has continued to evolve and incorporate more diverse funding sources and methods, such as fund raising efforts, privatization of activities, tuition increases, and others.

Federal support for higher education is provided through grants and financial aid and research. The federal government occasionally provided funding for higher education before World War II, but following the war its influence blossomed. The government began a practice of using grants to fund research. This has helped to strengthen graduate level programs, especially in the sciences. The federal government also began to provide funding for scholarships, loans, and grants for students who pursued an undergraduate education. These methods of funding have varied, but continue to be the main means of federal financial support (Thelin, 2004).

State funding for higher education is more involved in the annual running of the institutions. Since the beginning of the twentieth century, states have been providing annual support for public higher education institutions. The formula involved in providing this funding has continually changed; in the 1950s and 1960s there was a shift to funding based on enrollment. Colleges were provided with a per student amount of funding. This model provided a temporary solution to larger numbers of undergraduates, but state budgets could not consistently support increases in student numbers. This system still exists today, but is usually part of a multiple-dimension funding model (Thelin, 2004).

Beginning in the 1980s, the percentage of state funding spent on higher education stopped increasing and in many cases decreased. During this period, public officials began questioning the validity of college as a public good. They argued that most of the benefit of a college degree goes to the recipient of that degree and does not necessarily largely impact society as a whole. With many deeming higher education as a private good rather than a public good, many states began decreasing support to colleges and universities (Hersh & Merrow, 2005).

Colleges began raising tuition and increasing fundraising efforts to counter their loss in funding. The tuition hikes helped lead to public cries for accountability, and this caused a push for the privatization of college operations. This would make colleges work more like private companies focused on the product rather than on non-central activities with the students treated as customers (Eddy, Spaulding, & Murphy, 1996).

The increased call for accountability has also influenced many states to find ways to regulate colleges without increasing funding. This led to many states implementing performance-based reporting, performance-based budgeting, and/or performance-based funding. Most states

implemented some form of performance-based reporting, which required universities and colleges to provide data on certain performance indicators (McLendon et al, 2006).

Despite the failure of the early performance-based funding models, many states have adopted new versions of these models. Accountability in higher education is still an important issue to the public, federal government, and state governments. Until a better system is developed, performance-based funding has continued to be a state method for trying to affect performance indicators. For this reason, some states have implemented or considered performance-based systems and have changed criteria in the use and the amount of funding tied to performance indicators, creating a better chance of successfully affecting performance outcomes.

Government funding of higher education has a long history in the United States. The methods of supporting higher education have changed, but it is has become an expected method of funding. The federal government uses grants and financial aid to support colleges and students, and state governments are intimately involved in the annual funding of institutions. To ensure a wise use of their state monies, more accountability measures are in use, yet the amount of money available for investment has remained level. Administrators and policymakers must be cognizant of the changes in higher education funding and its implications to the institutions and the state.

B. Performance-based Funding

Overview

During the 1980s and 1990s, there was interest from the public and legislators for greater accountability in higher education (Zumeta, 2011). Increased scrutiny in the 1990s led many states to begin implementing performance-based funding models. However, many states

abandoned these programs after only a short period of implementation (Tandberg & Hillman, 2014; Dougherty et al., 2012). A thorough examination of performance-based funding models is necessary to understand the decline and resurgence of their use.

In the late twentieth century, there was increased use of performance-based funding in state funding of higher education (Shin, 2010). Tennessee was the first state to implement performance-based funding in 1979, and its model is still in use, but it has gone through several iterations (McLendon et al, 2006). Other states began implementing performance-based mechanisms during the 1990s. Half of the states in the U.S. have experimented with some form of performance-based funding, and many states have also begun setting up performance budgeting and performance reporting systems.

Performance budgeting and reporting have been more widely implemented than performance-based funding. By 2003 performance budgeting was adopted by 35 states, and performance reporting was used in 42 states (McLendon et al., 2006). The use of performance reporting is the most prevalent form of the performance initiatives in use today. This provides statistical reporting for the transparency valued in society without infringing on the autonomy of the colleges and universities.

In order to understand performance initiatives, it is important to understand the difference in performance funding, budgeting, and reporting. Performance reporting is making certain statistics and performance indicator results available for legislators, the public, and others. Performance budgeting examines performance indicators to influence the internal budgeting of an institution (Shin & Milton, 2004). This budgeting method directs the funds to areas that will help influence desired performance outcomes. Also, performance funding is providing state funding for the successful attainment of certain performance indicators (Shin & Milton, 2004). In

this model, money was given to the institution without specific budgeting constraints. Goals were established for the attainment of certain performance indicators. If the institution meets or exceeds these goals, then they will receive the allotted performance funding.

Performance-based funding has been implemented in a large number of states, and this has led to the establishment of many different models. Layzell (1998) identified four of the approaches usually used for performance-based funding systems. The first approach examined inputs, processes, and outcomes to get an overall view of the learning process. The second approach examined the effective use of resources to determine the value to the state and institution. The third approach focused on work force development by rewarding institutions that were providing programs and degrees that prepared students to meet state goals and needs. The final approach used performance indicators to focus on customer needs (Layzell, 1998). Many systems used the final approach and chose only a few performance indicators. By focusing on a few indicators, states were able to easily identify progression, or lack thereof, toward the chosen indicators.

Many indicators that could have been used to evaluate colleges, and some were used by performance-based funding models. Almost all of the models incorporated graduation and retention rates, but there were other indicators that vary from state to state. The other indicators that were regularly used included faculty workload, transfer rates, and sponsored research funds (Shin & Milton, 2004). Other indicators included degrees awarded, faculty productivity, employee diversity, instructional costs, faculty with terminal degree, student-teacher ratio, employer assessment of students, and enrollment size (Cavanaugh & Garland, 2012; Zarkesh & Beas, 2004).With the multitude of different indicators, it can be an overwhelming process to develop a cohesive picture of an institution's performance. For this reason, many states chose a

small subset of indicators to use, and a list of performance indicators in use in 2012 provided in Table 1 (Appendix A).

When states chose to implement performance-based funding models, there were many things considered to evaluate the type of performance indicator. The most common practice was to focus on performance indicators that were already reported, such as graduation rate and retention rates (Layzell, 1998). Focusing on only a few performance outcomes can lead to an unbalanced picture of performance at the institution. By ignoring input and process indicators, states could be focused on outputs that were dependent on other indicators. If this model continues, then it can negatively affect the quality of the education provided at an institution (King, 2007).

The model used in Pennsylvania originally included 17 indicators with 8 used as benchmarks for performance funding (Cavanaugh & Garland, 2012). When South Carolina implemented its performance-based funding model, it used 37 indicators (Watt et al, 2004). Large numbers of indicators can make it hard for colleges to improve in all of the areas at the same time (Layzell, 1998). This could spread the already limited budget of an institution too thinly and make budgeting questions more difficult. South Carolina was unable to balance its unwieldy 37 indicator model and decided to only give 3% of its funding based on these indicators while the rest of the state funding was allotted using the previous funding formulas (Watt et al., 2004).

States often developed their models based on the goals of the state as a whole, and did not take into account the mission of individual institutions (Cavanaugh & Garland, 2012)**.** Many state performance funding models held community colleges, four-year colleges, and universities to the same standards (Zarkesh & Beas, 2004)**.** The missions of community colleges and four-

year institutions do not lend themselves to an easy comparison through performance indicators. Even four-year colleges have different missions and goals. Clarion University in Pennsylvania offered many vocational degrees to meet the demand of its community, but this was not indicative of most four-year institutions (Cavanaugh & Garland, 2012). This could have an effect on normal bachelor degree attainment as many of the students will earn associate degrees or gain workplace training instead. These individual differences in institutions made it necessary to have performance models that are individualized for each institution. Pennsylvania redesigned its performance-based funding model to be more adaptive to each institution (Cavanaugh &Garland, 2012). Creating an elaborate performance-based funding model can be costly, but proponents argued that it can improve outcomes (Shin & Milton, 2004).

State decisions on funding in the past have been based on the influence of an institution and need than on performance, so performance-based funding was used to help increase quality (Tandberg & Hillman, 2014). One study found that using performance indicators had no significant statistical effect on the quality of education provided (Shin, 2010). Another study used graduation and retention rates to test the effectiveness of performance-based funding and found little to no effect on institutional outcomes (Sanford & Hunter, 2011). One study found no significance for performance-based funding, but it did find a small effect on states where the models combined performance and nonperformance funding (Shin & Milton, 2004).

There are several reasons offered for the ineffectiveness of performance-based funding. Several studies have cited a lack of follow through on the funding criteria employed in the performance-based models as the reason for the lack of positive increases in performance indicators (Shin, 2010). Lobbyists convince states to give money to institutions in spite of performance outcomes. There is also a reticence to decrease an already small portion of funding

to public institutions. States often continue supporting colleges in the same manner as they have in the past, but some advocates have argued that if a state implements performance-based funding and follows the guidelines they develop it can have a positive effect on outcomes of an institution (King, 2007; Shin, 2010).

Also confounding the issue is a lack of financial impact (Sanford & Hunter, 2011). States were not using large enough financial incentives to affect change. If states decide to attach more financial incentives to performance-based funding models, then institutions could make a more concerted effort to increase performance indicators.

Another factor that may cloud the effectiveness of performance funding was opposition from higher education leaders. Many have resisted the implementation of performance-based funding models for several reasons, including that some leaders felt that higher education leaders were not included in the development of the models and they feared that there would be a high cost of implementation and a loss of campus autonomy (Dougherty et al., 2012). Negative faculty perceptions concerning external mandated outcomes have also increased the resistance to performance-based funding (Frolich, 2011).

In order to fully explore performance-based funding, an understanding of the advantages and disadvantages must be established. Since the implementation of performance-based funding, accountability became a major focus of higher education and led to increased funding reporting that created a more thorough collection of data for all institutions (Zarkesh & Beas, 2004). This increase in data reporting could provide a basis to help research performance indicators more thoroughly.

Performance-based funding forces colleges to incorporate performance goals into their institutional mission and goals (Sharma, 2004). Using these funding models can help facilitate

better strategic planning at both the institutional and state levels (Dougherty & Reddy, 2011). In a few cases, there was some evidence of positive effects on performance outcomes. For example, colleges in Tennessee performed above the national norm on a standardized test (Shin & Milton, 2004).

While accountability and performance were valuable to higher education, performance-based funding also has several drawbacks, with the main concern being its inability to influence what it was designed to influence. According to several studies, performance-based funding has little to no effect on performance indicators (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). Many input factors were more predictive of these indicators than performance-based funding (Shin 2010).

Some faculty and researchers have felt that performance-based funding can lead to decreased internal accountability. This lessening of research quality has a negative effect on college prestige (Jongbloed &Vossensteyn, 2001). Teachers and researchers may ignore quality in order to meet performance indicator standards, and educators felt that the performance indicators were too constraining and did not account for all the aspects of a quality education (Dougherty et al., 2012; Frolich, 2011). This focus on meeting performance goals and not focusing on the process will, in the future, lead to less institutional autonomy, and institutional leaders perceiving that they will have to change their mission and identity to match the state mandated goals.

Several factors decreased the effectiveness of existing models and hampered examination of the effectiveness of each. Many state performance-based funding models relied on too few indicators, while other states relied on too many. South Carolina's 37 indicators and Pennsylvania's 17 indicators were examples of states with too many indicators (Watt et al, 2004;

Cavanaugh & Garland, 2012). If this trend continues, colleges could be overwhelmed by focusing on so many different areas, which could lead to overextension of financial and personnel resources. Many of these models also ignored institutional differences as states created a blanket system of performance standards and expected different types of institutions to perform similarly.

Another factor that confounded the issue was the blending of both performance and nonperformance funding. Many state funding models used combinations of both types of funding. A study by Shin and Milton (2004) showed a positive influence on graduation rates when both performance and nonperformance funding were used. In many cases the states did not follow through with the models as they were originally designed (Shin, 2010). Some of this was likely due to the resistance of institutions to these new funding mechanisms. As in the Pennsylvania case, early models failed to account for the focus of the different types of institutions (Cavanaugh & Garland, 2012). This made the models hard to apply fairly to different institutions. The recession in the early part of the twenty-first century also hampered many of the fledgling performance models (Dougherty et al., 2012).

Previous Studies

There have been several quantitative studies that have examined performance-based funding. A study performed by Shin (2010) focused on the effects of performance-based funding on student outcomes. The study examined data from 467 four-year colleges and universities over a ten year period starting in 1997. This article focused purely on graduation rate and found that the states lead initiatives had little to no effect on performance outcomes at institutions. It found that state initiatives had a limited effect on graduation rates, but most of the influence came from institutional characteristics. The study did state that most performance-based funding models

were all bark and no bite. States usually only required that the performance information be made public, but they did not actually change funding based on the outcomes. This severely hampered the effectiveness of performance-based funding models. The author recommended that states using performance-based funding offered more financial incentives to increase the effectiveness of the models (Shin, 2010).

Other quantitative studies also examined the relationship between performance-based funding and performance outcomes. A dissertation by Polatajko (2011) compared performance funding and nonperformance funding models and their influence on performance outcomes. The author looked at Tennessee, Florida, Ohio, Connecticut, and South Carolina to examine performance-based funding models and compared them to Michigan, Georgia, Arizona, Massachusetts, and Maryland, which used nonperformance funding models. He used a Hierarchical Linear Model (HLM) to examine the change in the outcomes over time. He found that the type of funding model was not a significant predictor of retention rates or graduation rates (Polatajko, 2011). The study did not include external inputs when examining the data, which could have an influence on the outcomes.

There were also studies that focused on one institution system. Sanford and Hunter (2011), for example, explored the effects of performance-based funding on graduation rates and retention in the Tennessee system. Tennessee has used performance-based funding for longer than most state models in the United States. This study found that performance-based funding had little to no effect on institutional outcomes. The authors attributed this to the size of the funding allotment given to each institution. They posed that if the allotment was increased, then there may be more impact on outcomes. The authors also asserted that the goals set for the performance goals were too low, which limits the effectiveness of the model. They argued for

exploration of alternative funding models (Sanford & Hunter, 2011). In order to increase the effectiveness of its model, Tennessee has increased the percentage of funding coming from performance indicators.

Shin and Milton (2004) examined graduation rates at four-year colleges and universities. It sought to determine the effectiveness of performance funding in affecting graduation rates. The authors discussed one positive instance where Tennessee institutions performed above the national average on a national standardized test. The authors then went on to explain the differences between performance funding and performance budgeting. Performance funding allocated a lump sum of money when performance indicators are met. This funding had little direction or oversight. Performance budgeting is using outcomes to direct budgeting decisions within different areas. The outcome expectations were less rigid in performance budgeting. The authors identified the common performance indicators such as retention rates, graduation rates, faculty workload, transfer rates, and sponsored research. The study also used an HLM growth model to examine the effect of performance-based funding. The study found no significant difference in graduation rate growth between performance and non-performance funding models. However, the rates were higher in states where both models were used (Shin & Milton, 2004).

The previous studies examined the effects of performance-based funding on outcomes using quantitative methods. There were also several different studies that used qualitative studies to examine performance-based funding. One qualitative study by Liefner (2003) examined the effects of funding on higher education performance. The study examined faculty reactions to the effects of different funding and resource allocation models on teaching and research. Faculty from six different universities in the United States and Europe were surveyed. The author found that faculty under performance-based funding models worked harder on research, but were less

likely to take risks. Despite different funding models, the faculty at the different institutions did not display a difference in the quality of teaching and research. Since the type of funding could limit creativity, the author argued for the use of more traditional funding models (Liefner, 2003).

Another qualitative study by Dougherty, Natow, and Vega (2012) investigated the reason for the failure of performance-based funding. The authors looked at data from several different states and their implementation of performance-based funding. They also interviewed a large number of administrators, politicians, and others. One of the main reasons for the downfall of many of these programs was the opposition from higher education institutions. Many institutions felt that the performance-based funding models threatened institutional autonomy. The indicators used for the models were often deemed to be unsound. Many participants felt that other types of indicators needed to be included in the models. The lessening of state support was also cited as a reason for the ineffectiveness of these models (Dougherty et al., 2012).

The previous qualitative studies focused specifically on performance-based funding. The following study looked at the accountability measures associated with performance funding. Huisman and Currie's (2004) qualitative study examined the effects of accountability measures on colleges in four different countries, and it explored perceptions of the measures put in place and discussed the consequences of these measures. A vast portion of the measures used student evaluations, performance indicators, and annual reviews to create accountability. The authors attributed the lack of educationally based performance indicators to legislators' lack of understanding of the inner workings of higher education institutions. In order to allow for smooth operation of these institutions, the author implies that the policies were made more lenient. Most of these accountability initiatives were ill conceived and did not create a sense of

positive change. The author asserts initiatives will have to change to provide a better system of accountability that has greater influence on institutions (Huisman & Currie, 2004).

A study by Frolich (2011) sought to explore faculty perceptions of the value of performance-based funding. The author surveyed faculty from Norwegian higher education institutions. For the most part, Frolich found that performance-based funding meant higher accountability. However, some groups asserted that higher performance indicators did not infer internal accountability improvement. The faculty worried that performance funding would have a negative effect on teaching and research (Frolich, 2011).

A report prepared by MPR Associate, Inc. (2007) for the U. S. Department of Education examined the funding systems in Indiana, Kansas, and Missouri to determine the effectiveness of performance funding in higher education. This report used the three states to examine positive and negative effects of performance-based funding and used these to create a rough template of how to create a viable performance funding model. The report emphasized that performance models can help create a large amount of accurate institutional data that can be used in the future to evaluate quality and other research areas. Performance funding can also promote better teacher effectiveness. Some of the drawbacks of performance-based funding included inability to apply to all institutions fairly and difficulty in determining the monetary worth of different performance indicators. The report was very thorough and would be helpful for any state designing a new performance-based funding model (MPR Associate, Inc., 2007).

The following study examined the reason performance-based funding was adopted by certain states. A study by McLendon, Hearn, and Deaton (2006) explored the reasons for implementing performance-based funding on a state level. They examined 47 states to look at the commonalities and differences between state funding models. They set forth 10 hypotheses for

the adoption of performance-based funding and examined the factors using a type of regression. The study found statistically significant results for states with a higher percentage of Republican legislators and in states with consolidated education governing boards. Governing boards were significantly tied to performance funding and to a lesser degree performance budgeting. While the percentage of Republican legislators was significantly tied to performance budgeting and to a lesser degree performance funding. All of the other variables examined had little value in determining the use of performance funding or budgeting. The authors posed the need to examine the reason for the decline in the number of performance funding models (McLendon et al., 2006).

Volkwein and Tandberg (2008) used the *Measuring Up* report cards to examine what factors influence participation, completion, and preparation. They found that the state controlled measures had little influence on *Measuring Up* grades. Demographics and other uncontrolled characteristics had a greater influence on these grades. Participation was positively influenced by institutional financial autonomy. Few of the changeable governmental practices had an effect on *Measuring Up* grades (Volkwein & Tandberg, 2008).

A study by Rabovsky (2012) sought to examine the influence of performance-based funding on state budget reform and institutional allocation of resources. It used correlation and basic statistical methods to examine the impact of performance-based funding. He found that performance-based funding did not have a significant effect on state budgets or institutional allocation of resources. The study showed that increased state funding has a general positive influence on performance outcomes.

Tandberg and Hillman's (2014) study also examined the effect of performance-based funding on performance indicators. They used data from the years before and after the

implementation of the performance-based funding models to determine the effect of the model. They also compared these states with performance funding to states without performance funding. The study showed no statistically significant impact from the use of performance-based funding. In a few cases there was a positive impact, but this only occurred after an extended implementation period.

All of the previous articles and studies were focused on performance-based funding in general. An article by Burke (1998) focused on and discussed the different performance indicators used by state colleges and universities. There were some commonalities among performance indicators from state to state, but there were more disparities. The indicators were often influenced by outside interests rather than within higher education. The push for performance-based funding illustrated a shift to a more client-based approach to education. The author argued for a collaboration of external and internal participants to help create a more cohesive performance funding model (Burke, 1998).

Then and Now

During the 1990s performance-based funding models was implemented in many states. Within a decade, a large portion of these models were abandoned. There were several different reasons given for the failure of these models. With these reasons in mind, many states in recent years began using what is often referred to as performance funding 2.0. This new iteration of performance-based funding was intended to address the problems with original models. By addressing these problems, states hoped to achieve the increases in performance indicators that were envisioned with the original performance-based funding models of the 1990s (Tandberg & Hillman, 2014).

There were several reasons often cited for the failure of the early performance-based funding models. One of the problems with the early models was the use of either too many or too few performance indicators. Both Pennsylvania and South Carolina originally implemented models using 17 and 37 indicators respectively (Cavanaugh & Garland, 2012; Watt et al, 2004). A large number of indicators made it difficult for institutions to pinpoint areas that will positively affect change in so many different areas. Conversely a conclusion can be drawn that having too few indicators can lead to an oversimplification of important performance indicators. Being too focused on one or two factors can lead to negative impacts in other areas important to state legislators, administrators, and/or faculty. Many states also used indicators that were not readily available or easily measurable. Performance-based funding often ignored input and intermediate indicators (Tandberg & Hillman, 2014).

Financial incentive was another factor that limited the effectiveness of performance-based funding (Layzell, 1998). Many of the early performance-based funding models were used strictly as additional funding. Colleges were still supported with the normal incremental state funding, but were offered additional funds for meeting certain performance goals. In many cases, these additional funds were small amounts. Some early models did include performance-based funding in the funding model for the state, but failed to maintain the original intent of the model (Shin & Milton, 2004). These models were often abandoned in order to not disrupt normal funding of institutions.

Institutional buy-in is another factor that affected state funding of higher education institutions (Tandberg & Hillman, 2014). Many of the first performance-based funding models were implemented without the involvement of the institutions involved. Many institutions perceived these new funding models as detrimental to the autonomy of the institutions and as a

distrust of the institutions ability to govern themselves. Many of the early state performance models made blanket requirements for all colleges and failed to take into account the differing foci of different institutions. This helped lead to a lack of institutional buy-in. States often just set out to improve certain performance indicators without taking into account state and institutional goals. This lack of vision had a negative effect on the effectiveness of these models and also negatively affected institutional buy-in.

Performance funding 2.0 sought to address many of the concerns raised about the original performance-based funding models. These models incorporated reasonable number of intermediate and output indicators to create a less end heavy picture of institutional achievement. Performance-based funding was used as part of the normal state funding formula in the 2.0 models and no longer served as a bonus allotment. In order to give more strength to performance funding, the funding given has also increased in performance funding 2.0. States have also created models that delineate between different types of institutions, which helped to create standards that are more adaptive (Tandberg & Hillman, 2014). With the new version, proponents of performance-based funding believed that it will have a greater impact on performance indicators.

C. North Central Association of Colleges and Schools

Overview of Accreditation

Higher education in the United States developed differently than other nations. The U.S. had no national university and no oversight of higher education institutions. There were a few movements to rectify this lapse, but none of the propositions to create a national university or create a national oversight of institutions came to fruition. Early colleges, academies, universities, and other institutions ranged the gambit from glorified high schools to full-fledged

colleges. During the 1800s, there was not a clear standard of how individual institutions were classified. To help delineate between the different college accreditation associations began forming in 1885 with the founding of the New England Association of Schools and Colleges. In the early years of accreditation, these associations classified schools. They did not develop the continual process of accreditation until well into the twentieth century (Brittingham, 2009).

Early efforts at accreditation had strict standards that all colleges within the region had to meet. In 1934, the NCA used a mission-based criteria for accreditation. In this type of system, the missions were established and colleges were periodically monitored to ascertain their progression toward goals and the quality of the education provided. The system used today gradually developed in the 1950s and 1960s. This system involved creating standards, using institutional missions to guide decisions, an institutional self-study, peer review, and periodic review by a commission. These mechanisms are still in place today, but the way that they are evaluated has evolved over time. The current methods of accreditation focuses on improving institutions in the future. The association tasked with accrediting colleges help institutions to set goals and work toward improving different aspects of the institution (Brittingham, 2009).

There are many concerns about regional accreditation. Many critics of regional accreditation feel that the need for regionalism has passed. With increases in technology, it is no longer necessary for regions to determine the validity of their institutions. Regional Accreditation relies on peer institutions to develop the standards and processes used to determine accreditation. This may lead to lax standards of accreditation. For this reason, many critics want national accrediting standards. Critics also cite a lack of transparency in reporting data collected from institutions for accreditation. They also cite the difficulty in transferring credits from different institutions. If colleges are accredited, then their courses should transfer to other

accredited institutions (Bardo, 2009). Accreditation associations are constantly adapting to meet the concerns about regional accreditation. The associations are making strides to become more transparent and overcome perceived problems with the system.

Table 1

Regional Accrediting Bodies and States Covered

Accrediting Body	States
Middle States Association of Colleges and Schools	Delaware, Maryland, New Jersey, New York, Pennsylvania
New England Association of Schools and Colleges	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
North Central Association of Colleges and Schools	Arizona, Arkansas, Colorado, Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, New Mexico, North Dakota, Ohio, Oklahoma, South Dakota, West Virginia, Wisconsin, Wyoming
Northwest Accreditation Commission	Alaska, Idaho, Montana, Nevada, Oregon, Utah, Washington
Southern Association of Colleges and Schools	Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Virginia
Western Association of Schools and Colleges	California, Hawaii

Source: U.S. Department of Education

History and Purpose

The NCA was originally founded in 1895 to create a more cohesive link between secondary and postsecondary education (North Central Association of Colleges and Schools [NCA], n.d.). It was originally comprised of seven Midwestern states. It originally accredited secondary schools, but soon after its inception it began accrediting colleges and universities as well. There are now 19 states in the NCA. The purpose of the NCA listed on its website is as follows:

> The purpose of the Association shall be to require its Commission member to have accrediting processes that foster quality, encourage academic excellence, and improve teaching and learning. The Association shall also encourage and support cooperative relationships among schools, and colleges and universities that hold membership in the Association (NCA, n.d.).

The states associated with NCA are located in the Midwest and west region of the U.S. Colleges and universities within NCA are evaluated by the Higher Learning Commission (HLC, n.d.).

In order to receive accreditation, an institution must meet the Core components expected by the Higher Learning Commission (HLC). It must also meet the criterion set forth by HLC. The criteria are mission, ethical and responsible conduct, high quality education, evaluation and improvement of teaching and learning, resources, planning, and institutional effectiveness (HLC, n.d.).

Once an institution is accredited, then they must maintain accreditation. There are two methods for maintaining accreditation: Program to Evaluate and Advance Quality (PEAQ) and Academic Quality Improvement Program (AQIP). The PEAQ has a four step process. First, the institutions will perform a self-study following the guidelines provided by the HLC. Second, the HLC sends a team of peer reviewers to do a comprehensive examination of the institution and give recommendations. Third, the recommendations are evaluated by a decision-making body. Last, a decision concerning accreditation is made for the institution. PEAQ is in the process of being replaced by two new methods: the Standard Pathway and the Open Pathway. However, the years of this study the PEAQ is still being used (HLC, n.d.).

Academic Quality Improvement Program (AQIP) is a system of institutional accreditation through improvement. This method of accreditation seeks to improve the quality of education at institutions through the process. Institutions have to meet standards, but they also must make strides in improving some aspect of their education process. AQIP has six categories

for institutional evaluation, including helping students learn, meeting student and other key stakeholder needs, valuing employees, planning and leading, knowledge management and resource stewardship, and quality overview focuses on the continuous quality improvement. AQIP is designed to help institutions make assessment and improvement a continuous aspect of institutional governance (HLC, n.d.).

Table 2

North Central Association of Colleges and School State Characteristics 2014

State	Percent With Bachelor Degrees	Number of Public Four-year Institutions	Number of Private Four - year Nonprofit Institutions	Number of Students Enrolled
Arizona	17.20	4	11	621,610
Arkansas	13.80	11	12	157,504
Colorado	23.80	15	11	309,331
Illinois	19.70	12	81	714,200
Indiana	15.00	15	39	392,625
Iowa	18.10	3	33	315,418
Kansas	19.50	8	22	187,868
Michigan	16.00	15	49	575,510
Minnesota	22.40	12	35	335,747
Missouri	16.70	13	53	363,308
Nebraska	19.30	7	16	115,721
New Mexico	14.90	9	3	141,773
North Dakota	19.60	9	6	48,123
Ohio	16.00	35	68	618,997
Oklahoma	15.80	17	14	202,064
South Dakota	18.10	7	7	49,259
West Virginia	11.40	13	8	136,155
Wisconsin	17.90	14	30	329,773
Wyoming	16.90	1	0	35,103

Source: Chronicle of Higher Education Almanac

Culture

Most of the States within the North Central Association of Colleges and Schools are within the Midwest region of the United States. Midwest states share a unique culture. The Midwest was first identified in 1901 by Fred Jackson Turner when he coined the term “Middle

West" (Ubbelohde, 1994). Following his used of "Middle West" in print, other authors began following suit (Ubbelohde, 1994). Before this period the Midwest and the rest of the western United States had been lumped together. With the settlement of the West, regions of the west began developing along different courses. The Midwest became an agrarian society with agriculture as the core of its development (Ubbelohde, 1994). One section of the Midwest is the Old Northwest, so defined because of its relation to the original 13 colonies (Ubbelohde, 1994). The Old Northwest was later called the North Central division and this nomenclature would account for the naming of the NCA (Ubbelohde, 1994). The Midwest is an amalgamation of disparate regions that have melded into a semi-cohesive region (Ubbelohde, 1994). The Midwest is a blending of southern, Ohio River valley, plains, and western influences. These different influences have helped to create a unique Midwest culture (Ubbelohde, 1994).

According to Ryden (1999), the Midwest region unlike other regions does not have a strong historical identity. The Midwest tends to be centered on the current culture. Midwesterners take pride in the achievements of their community. This community pride is the backbone of Midwestern culture. The Midwest, to many, exemplifies the small town feel and community identity often portrayed in television, movies, and books. The history of the Midwest is the community histories. This centers the Midwest on personal experiences and history. Individuals identify with their community and the community's history is created through its individual citizens (Ryden, 1999).

Midwest appreciation of community has an impact on educational support. In order to support community growth, Midwestern states have historically supported education. This includes supporting higher education. This history of support for higher education has continued into the present day.

D. Chapter Summary

This chapter was a review of the literature concerning performance-based funding in higher education, specifically focused on four-year public institutions within the NCA. The first section gave an overview of public funding of higher education including trends in public funding and a discussion of incremental and rational budgeting. The second section of the literature review focused on performance-based funding. This included an overview of performance-based funding and how it developed. This section also explored much of the research involving performance-based funding. The final subsection of the second section explored how performance funding adapted to correct many of the issues that plagued the early performance-based models. The final section of the literature review was focused on NCA. This included an overview of the history and processes involved in accreditation within NCA. This section also discussed the culture of the region represented by the NCA. The next chapter will outline the methods that were used to fulfill the purpose outlined in chapter 1.

III. Methods

The purpose of the study was to explore performance-based funding by examining the relationship between the types of funding and performance indicators at four-year public higher education institutions in the North Central Association of Colleges and Schools (NCA). This study focused on six states within NCA, including three states that have been using performance-based funding and three states using incremental funding. This chapter discussed the methods used to evaluate the relationship between amount of funding and performance indicators. The chapter discussed the sample used for the study, the design of the experiment, the data collection, and the method of analysis for each research question.

Sample

This study focused on the NCA, which comprises 19 states shown in Table 2 and Table 3. These 19 states are located in the Midwest and West regions of the United States (NCA, n.d.). The Higher Learning Commission (HLC) serves as the accrediting body for the NCA. The HLC has a few different paths to gain accreditation and maintain it, including Academic Quality Improvement Program (AQIP) and Program to Evaluate and Advance Quality (PEAQ) (HLC, n.d.). AQIP uses accreditation to help influence improvement in the quality of education and to increase performance outcomes. PEAQ is a four step process that includes a self-study, peer review, recommendations, and decision on accreditation. This process is being replaced by the Standard Pathway and Open Pathway.

The participants in the study were the four-year public institutions from the six states within the NCA. All four-year public institutions within each state with available data were included in this study. Three states that used performance-based funding for an extended period were chosen from within the NCA, and three states without performance-based funding were

chosen that pair well with the three previous states. States were considered to pair well if they have a similar or proportional number (with regards to population) of public four-year institutions, similar four year graduation rates, and similar tuition rates for four-year public institutions. Many of these data values are shown in Table 3. All the four-year public institutions within each of the six states were included in the study. The three performance-based funding states included Indiana, Kansas, and Ohio. The three incremental funding states included Colorado, Nebraska, and Wisconsin. Indiana was paired with Colorado, Kansas was paired with Nebraska, and Ohio was paired with Wisconsin. The paired states were shown in Table 4. States were chosen from within the NCA to control for any effects influenced by accrediting methods.

Table 3

North Central Association of colleges and School State Characteristics 2014

State	Population	Number of Public Four-Year Institutions	Four-Year Grad Rates	Avg. Tuition Public Four-Year	State Funds for Expenses
Arizona	6,553,255	4	51.80%	9,008	873,005,600
Arkansas	2,949,131	11	44.30	6,386	851,971,705
Colorado	5,187,582	15	54.00	6,895	679,462,447
Illinois	12,875,255	12	62.70	11,346	4,082,978,500
Indiana	6,537,334	15	59.50	7,990	1,701,417,328
Iowa	3,074,186	3	65.80	7,572	823,333,019
Kansas	2,885,905	8	52.80	6,676	771,121,325
Michigan	9,883,360	15	60.10	10,538	1,669,524,700
Minnesota	5,379,139	12	63.00	9,754	1,394,503,000
Missouri	6,021,988	13	56.40	7,613	967,122,534
Nebraska	1,855,525	7	57.70	6,737	688,173,035
New Mexico	2,085,538	9	40.60	5,307	871,115,913
North Dakota	699,628	9	49.70	6,440	409,693,640
Ohio	11,544,225	35	58.10	8,962	2,096,295,591
Oklahoma	3,814,820	17	46.70	5,543	1,042,049,007
South Dakota	833,354	7	49.80	6,959	198,267,076
West Virginia	1,855,413	13	47.10	5,279	515,656,320
Wisconsin	5,726,398	14	60.30	7,861	1,114,018,800
Wyoming	576,412	1	54.00	3,501	352,419,041

Source: Chronicle of Higher Education Almanac

Table 4

Paired States With Comparison Values

	Funding Type	Population	Number of Public Four-Year Institutions	Four-Year Graduation Rate	Average Tuition Public Four-Year
Pair 1					
Indiana	Performance-based	6,537,334	15	59.5%	7,990
Colorado	Incremental	5,187,582	15	54.0	5,895
Pair 2					
Kansas	Performance-based	2,885,905	8	52.8	6,676
Nebraska	Incremental	1,855,525	7	57.7	6,737
Pair 3					
Ohio	Performance-based	11,544,225	35	58.1%	8,962
Wisconsin	Incremental	5,726,398	14	60.3%	7,861

Source: Chronicle of Higher Education Almanac

Design

Previous studies have shown little to no effect on performance outcomes from performance-based funding, so the study focused on exploring any basic relationship (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). The study examined the relationship between the state funding and performance outcomes. Each state was examined and compared to the states with the same type of funding. This explored if the relationships are similar for states with similar funding types. In this way, the states with the same type of funding were explored in the same way and compared, which allowed for a comparison of similar states and helped show the similarities and differences. The overall relationships were examined for all the states that showed the general trend present among all types of funding. The paired states were compared to examine the similarities and differences created with the different funding models when used in comparable states. After the different relationships within these different comparison groups were examined, the study created equations for predicting performance outcomes within each type of funding that used the amount of state funding and other factors to

predict retention rates and graduation rates. In order to gain a thorough understanding of this relationship, a five-year period from 2008-2013 was examined to explore this relationship over an extended period.

Collection of Data

The data used for the study was gathered using the Integrated Postsecondary Education Data System (IPEDS, n.d.). IPEDS is a comprehensive data collection site with data for higher education institutions within the United States. This includes financial data, institutional characteristics, categorical information, and other variables examined for each institution. The data will be collected for school years of 2008-2009, 2009-2010, 2010-2011, 2011-2012, and 2012-2013.

Data Analysis

The relationship between type of funding and performance outcomes was examined using the Pearson product-moment correlation between amount of state funding and different performance outcomes. This yielded a Pearson product-moment correlation coefficient which allowed for the comparison of the direction and strength of the relationship between two different variables (Glass & Hopkins, 1996). The Pearson product-moment correlation will be referred to as correlation for the remainder of the paper. The use of a correlation coefficient is the best way to ascertain if a relationship exists between two variables and the strength of that relationship. The correlation ranges from -1 to 1 with 1 and -1 representing perfect correlation between to variables. A correlation of 0 represents no correlation between the variables. A strong correlation exists if the values are closer to 1 or -1. A negative correlation means that there is a negative relationship between variables, while a positive correlation shows a positive relationship between the variables. Once the correlations are examined, multiple linear

regression will be used to create an equation that will predict the performance outcomes (graduation rates and retention rates). The validity of this predictive model will be explored using the correlation coefficients of different models produced and by examining the correlations produced during the study.

Research Question 1

1. What were the state funding trends during the past five years for public four-year higher education institutions in North Central Association of Colleges and Schools (NCA)?

This research question was explored by examining the overall data given for the institutions within the six states chosen. The individual states were researched to see the changes in funding schemes over a five year period. At the time of the study the 2013-2014 data still had elements that were estimates, so the study will focus on 2008-2009, 2009-2010, 2010-2011, 2011-2012, and 2012-2013. These years were chosen because they have finalized data for all of the years. There were several variables examined, including the average state allocation to higher education, the percent increase and/or decrease in allocation per state to higher education, and the overall percent increase and/or for all of the states together. These was examined for each of the five years for the study. The use of descriptive data in this manner allowed for some generalizations about state funding trends within the NCA (Creswell, 2007). This will give an overall picturing of funding at these states within the NCA.

Research Question 2

2. To what extent was there a correlation between performance-based funding and both retention rate and graduation rate at public four-year institutions in North Central Association of Colleges and Schools (NCA)?

The state funding provided for each four-year public institution within the performance-based funding states was compared with retention rates and graduation rates to examine the correlation over the five years asserted previously. This showed if there were a trend present between the two variables being compared. Average state appropriations per student was compared to full-time retention rates, four-year baccalaureate graduation rates, six-year baccalaureate graduation rates for the same years. The state appropriations per student was used instead of overall state appropriations to control for the differences in size between institutions. Graduation rates and retention rates are a representation of success for incoming first-time, full-time freshmen classes from previous years, which need to be examined in this context. For this reason, lag comparisons for retention rates and graduation rates were also performed. The correlation for retention rates were compared with state appropriations per student from the previous year. This examined the correlation of funding when students enter and the student retention the following year. For example, state appropriations from 2008-2009 were compared to full-time retention rates from 2009-2010. Four-year graduation rates will be compared to the state appropriations per student for the four years before the graduation. This will examine the correlation between funding during the first four years of college and four-year graduation rate. For example, the combined state appropriations per student for 2008-2009, 2009-2010, 2010-2011, and 2011-2012 were compared to four year graduation rate for 2011-2012. These correlations were examined for all three states individually and collectively. Ideally the specific amount given for performance-based funding would be used to examine the correlation. This value is not readily available for each institution, so the overall amount given to each institution will be used. For this reason, the individual states were compared to their paired state to examine the difference in effect. Once the correlation coefficients were calculated, the correlations were

examined for statistical significance with regards to both a 0.05 significance level and a 0.01 significance level.

Research Question 3

3. To what extent was there a correlation between incremental funding and both retention rate and graduation rate at public four-year institutions in North Central Association of Colleges and Schools (NCA)?

The same process used in the second research question was utilized to examine states with incremental funding through the use of scatter plots and correlation coefficients over the five years of the study. This showed if there was a trend present between the two variables being compared. Average state appropriations per student was compared to full-time retention rates, four year graduation rates, six-year graduation rates for the same years. Graduation rates and retention rates are a representation of success for incoming freshmen classes from previous years, and also need to be examined in this context. For this reason, lag comparisons for retention rates and graduation rates were also performed. The correlation for retention rates were compared with state appropriations per student from the previous year. This correlation examined the correlation of funding when students enter and their particular retention. For example, state appropriations from 2008-2009 were compared to full-time retention rates from 2009-2010. Four year graduation rates were compared to the state appropriations per student from four years before the graduation. This will examine the correlation between funding during the first four years of college and four year graduation rate. For example, the combined state appropriations per student for 2008-2009, 2009-2010, 2010-2011, and 2011-2012 were compared to the four year graduation rate for 2011-2012. These correlations will be examined for all three states individually and collectively. The individual states will also be compared to

their paired state to examine the difference in correlation. Once the correlation coefficients were calculated, the correlations were examined for statistical significance with regards to both a 0.05 significance level and a 0.01 significance level.

Research Question 4

4. To what extent could the amount of state funding in conjunction with either performance-based funding or incremental funding be used to influence and/or predict increases in both retention rate and graduation rate?

Using the correlations gathered for the previous question and finding the correlations for other institutional variables that may affect graduation rate and retention rate, the study used multiple linear regression to create a predictive model. The input variables were state enrollment, state appropriations per student, full-time first-time degree seeking undergraduate enrollment, percent admitted total, full-time enrollment, total enrollment, percentage receiving any financial aid, percentage receiving federal, state, local or institutional grant aid, percentage receiving Pell grants, percentage receiving federal loan aid, ACT 25^{th} percentile composite score, ACT 75^{th} percentile composite score, SAT 25^{th} percentile composite score, and SAT 75^{th} percentile composite score. These were used to create models within both performance-based funding states and incremental funding states to predict graduation rate four year and full-time retention rate. Variables that showed a statistically significant correlation coefficient were used to create a regression equation. Once the variables were narrowed down in this fashion, then multiple linear regression was used with backwards stepwise elimination. Using this method the study created equations using various input variables to predict full-time retention rate and graduation rate four year. This provided a few possible models. The models were examined for the different types of funding and their variables were compared. This comparison will help to examine the possible

influences of state funding within state with performance-based funding and incremental funding. The models will be evaluated based on a 0.05 and 0.01 significance levels using Analysis of Variance (ANOVA).

Chapter Summary

This chapter detailed the statistical analysis that was used to explore the purpose of this study. The study used data gathered from six states within the NCA. Indiana, Kansas, and Ohio was used to explore states that have had performance-based funding in place for an extended period. These three states were compared to Colorado, Nebraska, and Wisconsin, which utilized incremental funding. These states were all examined individually and in comparison to each other to ascertain the relationship between state funding and performance outcomes. The data used for this experiment came from IPEDS (IPEDS, n.d.).

The relationship between funding and performance outcomes was examined using Pearson product-moment correlation for 2007-2008, 2008-2009, 2009-2010, 2010-2011, 2011-2012, and 2012-2013. The state funding amount and performance outcomes over this period were examined using scatter plots and the Pearson product-moment correlation coefficient to determine if a relationship existed and the strength of that relationship. These values were explored for each state individually, for states with performance funding, for states with incremental funding, and for all states. These states were compared to determine if there was a statistically stronger relationship for any of the different types of funding. Once the relationships were explored, the correlation values were used to identify variables that influence performance outcomes and regression were used to create a predictive equation for affecting performance outcomes.

IV. Data Analysis

The purpose of this study was to explore performance-based funding at four-year public colleges in the North Central Association of Colleges and Schools (NCA). Performance-based funding has had a renaissance of use in recent years with many states adopting this method of funding (Sanford & Hunter, 2011). Performance-based funding ties funding to achievement of set performance goals. This type of funding is intended to help improve performance outcomes, such as graduation rates and retention rates. Previous studies have shown, the effect of performance-based funding on graduation or retention rates (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). This study examined the correlation between state funding and both graduation rates and retention rates in states that utilize performance-based funding in the NCA and compares this to states that have incremental funding. It also used state funding and other input values to create a model/equation for predicting retention or graduation rates by using multiple linear regression.

Summary of the Study

An exploration of performance-based funding in the NCA began with an examination of the general trends in funding within all the states of the NCA. After the general funding trends were explored, the next step was the identification of states that used performance-based funding from 2008-2013. During this time period, only Indiana, Kansas, and Ohio maintained performance-based funding for the entire duration. The funding provided for every four-year public institution within these states were correlated with retention rate and graduation rate for those institutions. The best correlations would be found using the actual amount given based on the performance-based funding model. However, this information was not readily available; so a different approach was used to explore the relationship between funding and performance

outcomes. The overall state appropriations for each of the institutions were explored to find the correlation between funding and the performance outcomes. A similar state with incremental funding was used for comparison to each performance-based funding state to help examine the differences in the effect of funding on the performance outcomes. Colorado, Nebraska, and Wisconsin were the states with incremental funding used for comparison.

The study correlated state appropriations with full-time retention rate, graduation rate total cohort, graduation rate four year, and graduation rate six year. In order to control for institution size, state appropriations per student was also correlated with the four performance outcomes. After these correlations were completed, state appropriations and state appropriations per student were used with 13 other input variables to create equations within each type of state funding to influence and/or predict full-time retention rate and graduation rate four year.

Data Analysis

Research Question 1

1. What were the state funding trends during the past five years for public four-year higher education institutions in North Central Association of Colleges and Schools (NCA)?

The overall state funding during this period was examined using the data from the Chronicle of Higher Education Almanac for each given year. The State funding data for all of the states in the NCA are shown in Table 5, Table 6, and Table 7. The average state funding for all states for the entire five-year period was $1,088,637,820. The average state funding for all states in 2008-2009 was $1,132,902,789. The average state funding amount for all state in 2009-2010 fell to $1,119,120,158. In 2010-2011, the average state funding for all states fell to $1,097,022,203. The average state funding amount for all state in 2011-2012 fell to $1,041,739,757. The average state funding amount for all state in 2012-2013 rose to

$1,052,404,191. Over the entire period the state funding average slowly declined. The last year saw a slight increase, but not by much.

Table 5

Overall State Funding by Year Within NCA 2008-2011

State	2008-2009	2009-2010	2010-2011
Arizona	1,227,594,000	1,103,840,000	1,025,534,200
Arkansas	858,501,000	918,942,000	915,440,578
Colorado	802,400,000	830,301,000	765,512,315
Illinois	3,011,705,000	3,133,876,000	3,185,176,200
Indiana	1,594,375,000	1,639,843,000	1,567,194,065
Iowa	935,161,000	827,395,000	758,772,875
Kansas	839,517,000	793,701,000	795,182,338
Michigan	2,061,066,000	1,905,704,000	1,869,659,000
Minnesota	1,576,292,000	1,565,412,000	1,381,065,000
Missouri	1,027,185,000	1,176,136,000	968,935,126
Nebraska	632,901,000	622,962,000	653,935,362
New Mexico	901,770,000	892,950,000	886,623,832
North Dakota	253,901,000	300,891,000	311,678,000
Ohio	2,499,847,000	2,278,285,000	2,155,276,790
Oklahoma	1,025,024,000	1,086,716,000	1,074,812,732
South Dakota	201,521,000	163,122,000	196,616,485
West Virginia	470,705,000	517,837,000	527,395,510
Wisconsin	1,292,042,000	1,191,512,000	1,420,721,709
Wyoming	313,646,000	313,858,000	383,889,743
Total	21,525,153,000	21,263,283,000	20,843,421,860
Average	1,132,902,789	1,119,120,158	1,097,022,203

Source: Chronicle of Higher Education Almanac

Examining the percent change during this period can help to show how significant these changes in funding were. During the five year period of the study, the overall average percent change from the first to the last year was -3.99%. This shows that there was a slight overall decrease of roughly 4% in state funding within the NCA during this entire period. Changes from year to year were also examined. The average percent change between 2008-2009 and 2009-2010 was -0.37%, while the average percent change between 2009-2010 and 2010-2011 was 0.41%. Also, the average percent change between 2010-2011 and 2011-2012 was -6.08%; and

the average percent change between 2011-2012 and 2012-2013 was 2.11%. It was interesting to note that the percent change was positive from 2009-2010 to 2010-2011, while the average state funding amount decreased. This occurred due to large increases in funding at states giving smaller amounts, while some of the states giving more funding decreased. The percent increase of the states giving a smaller amount was larger than the percent decrease in the states giving more, which caused the overall percent change to be positive despite the state allocation average decreasing.

Table 6

Overall State Funding by Year Within NCA 2011-2013 and State Funding Averages 2008-2013

State	2011-2012	2012-2013	State Average
Arizona	814,457,600	840,320,500	1,002,349,260
Arkansas	903,589,798	906,500,781	900,594,831
Colorado	647,496,274	640,628,978	737,267,713
Illinois	3,585,962,200	3,566,692,200	3,296,682,320
Indiana	1,549,460,261	1,555,282,625	1,581,230,990
Iowa	739,051,670	787,419,692	809,560,047
Kansas	739,612,189	759,215,686	785,445,643
Michigan	1,641,658,900	1,596,324,500	1,814,882,480
Minnesota	1,283,690,000	1,285,247,000	1,418,341,200
Missouri	930,089,844	931,239,665	1,006,717,127
Nebraska	650,437,323	659,571,367	643,961,410
New Mexico	798,972,305	799,405,505	855,944,328
North Dakota	343,964,303	343,805,783	310,848,017
Ohio	2,013,797,074	2,039,964,448	2,197,434,062
Oklahoma	945,260,277	981,069,415	1,022,576,485
South Dakota	179,516,376	190,251,431	186,205,458
West Virginia	536,382,781	545,760,686	519,616,195
Wisconsin	1,153,558,680	1,182,780,084	1,248,122,895
Wyoming	336,097,525	384,199,290	346,338,112
Total	19,793,055,380	19,995,679,636	20,684,118,575
Average	1,041,739,757	1,052,404,191	1,088,637,820

Source: Chronicle of Higher Education Almanac

During this period, the funding for all of the states fluctuated differently depending on the state. The highest amount given by any state was Illinois, which gave $3,585,962,200 in 2011-

2012. Conversely, the small amount given was $163,122,000 by South Dakota in 2009-2010. Illinois and South Dakota also had the highest and lowest average state funding amounts with $3,296,682,320 and $186,205,458 respectively. The highest percent change was from 2009-2010 to 2010-2011 in Wyoming, which increased by 22.31%. The lowest percent change was -20.58% which occurred in Arizona from 2010-2011 to 2011-2012. The largest overall percent change from the first year to the last year was 22.49% in Wyoming, while lowest percent change was -31.55% in Arizona. Overall for all states, during the first four years most of the states were decreasing regularly. During the final year of the study, many of the states began making funding increases. The overall funding for the entire period did go down on average, but it appears to be making a slow recovery. After examining the state funding amounts for all states, it is helpful to also examine the funding within performance-based funding and incremental funding states.

During the period of this study, only Indiana, Kansas, and Ohio maintained performance-based funding for the entire period. The state funding for these states is in Table 8, Table 9, and Table 10. The average state funding amount for performance-based funding states during this period was $1,521,370,232. The average state funding amount for each year were $1,644,579,667 in 2008-2009, $1,570,609,667 in 2009-2010, $1,505,884,398 in 2010-2011, $1,434,289,841 in 2011-2012, and $1,451,487,586 in 2012-2013. This appears to fit the overall trend for all states discussed previously with a decrease for the first four years and then a slight increase in the fifth year. States with performance-based funding were funded similarly to the pattern of all the states together.

Table 7

Percent Change in State Funding Within NCA 2008-2013

State	Percent Change 2008-2009 to 2009-2010	Percent Change 2009-2010 to 2010-2011	Percent Change 2010-2011 to 2011-2012	Percent Change 2011-2012 to 2012-2013	Overall Percent Change
Arizona	-10.08	-7.09	-20.58	3.18	-31.55
Arkansas	7.04	-0.38	-1.29	0.32	5.59
Colorado	3.48	-7.80	-15.42	-1.06	-20.16
Illinois	4.06	1.64	12.58	-0.54	18.43
Indiana	2.85	-4.43	-1.13	0.38	-2.45
Iowa	-11.52	-8.29	-2.60	6.54	-15.80
Kansas	-5.46	0.19	-6.99	2.65	-9.57
Michigan	-7.54	-1.89	-12.19	-2.76	-22.55
Minnesota	-0.69	-11.78	-7.05	0.12	-18.46
Missouri	14.50	-17.62	-4.01	0.12	-9.34
Nebraska	-1.57	4.97	-0.53	1.40	4.21
New Mexico	-0.98	-0.71	-9.89	0.05	-11.35
North Dakota	18.51	3.59	10.36	-0.05	35.41
Ohio	-8.86	-5.40	-6.56	1.30	-18.40
Oklahoma	6.02	-1.10	-12.05	3.79	-4.29
South Dakota	-19.05	20.53	-8.70	5.98	-5.59
West Virginia	10.01	1.85	1.70	1.75	15.95
Wisconsin	-7.78	19.24	-18.80	2.53	-8.46
Wyoming	0.07	22.31	-12.45	14.31	22.49
Total	-1.22	-1.97	-5.04	1.02	-7.11
Average	-0.37	0.41	-6.08	2.11	-3.99

Source: Chronicle of Higher Education Almanac

The percent change during this period was also useful to examine, because it helped to note funding changes on the state level between years. During the five-year period of the study, the overall average percent change within the three states with performance-based funding from the first to the last year was -10.14%. This shows that there was an overall decrease of roughly 10% in state funding in performance-based funding states during this period, which was larger than the decrease for all states discussed previously. Within these three states, the average percent change between 2008-2009 and 2009-2010 was -3.82%, while the average percent change between 2009-2010 and 2010-2011 was -3.21%. The average percent change between

2010-2011 and 2011-2012 was -4.89%, and the average percent change between 2011-2012 and 2012-2013 was 1.44%. These values closely emulate the changes suggested by the state funding amounts in these states. It decreases for the beginning years and increased slightly the last year of change.

Table 8

Overall State Funding by Year for States With Performance-Based Funding Within NCA 2008-2011

State	2008-2009	2009-2010	2010-2011
Indiana	1,594,375,000	1,639,843,000	1,567,194,065
Kansas	839,517,000	793,701,000	795,182,338
Ohio	2,499,847,000	2,278,285,000	2,155,276,790
Total	4,933,739,000	4,711,829,000	4,517,653,193
Average	1,644,579,667	1,570,609,667	1,505,884,398

Source: Chronicle of Higher Education Almanac

Table 9

Overall State Funding by Year for States With Performance-Based Funding Within NCA 2011-2013 and State Funding Averages 2008-2013

State	2011-2012	2012-2013	State Average
Indiana	1,549,460,261	1,555,282,625	1,581,230,990
Kansas	739,612,189	759,215,686	785,445,643
Ohio	2,013,797,074	2,039,964,448	2,197,434,062
Total	4,302,869,524	4,354,462,759	4,564,110,695
Average	1,434,289,841	1,451,487,586	1,521,370,232

Source: Chronicle of Higher Education Almanac

Looking at the funding within Indiana, Kansas, and Ohio, there were differences within the states. Indiana showed an increase of 2.85% from 2008-2009 to 2009-2010, while Kansas and Ohio decreased by 5.46% and 8.86% respectively. Kansas increased by 0.19% from 2009-2010 to 2010-2011, while Indiana and Ohio decreased by 4.43% and 5.40% respectively. While the states, in general, met the trend previously explored for all states, the individual states had irregularities that did not match up. Indiana and Kansas both had a year of increase despite the

trend of decreased funding over the first four years. Ohio had the highest state funding amount of $2,499,847,000 in 2008-2009, and the highest overall state funding average at $2,197,434,062. Kansas had the lowest state funding amount at $739,612,189, and the lowest state funding average at $785,445,643. The highest percent change was 2.85% by Indiana from 2008-2009 to 2009-2010. The lowest percent change was -8.86% by Ohio from 2008-2009 to 2009-2010. Ohio also had the lowest overall percent change from the first to last year with -18.40%. Indiana had the highest overall percent change from the first to last year with -2.45%. All three of these state gave less by the end of the period than they gave at the beginning, which fits the overall trend for all states.

Table 10

Percent Change in State Funding for States With Performance-based Funding Within NCA 2008-2013

State	Percent Change 2008-2009 to 2009-2010	Percent Change 2009-2010 to 2010-2011	Percent Change 2010-2011 to 2011-2012	Percent Change 2011-2012 to 2012-2013	Overall Percent Change
Indiana	2.85	-4.43	-1.13	0.38	-2.45
Kansas	-5.46	0.19	-6.99	2.65	-9.57
Ohio	-8.86	-5.40	-6.56	1.30	-18.40
Total	-4.50	-4.12	-4.75	1.20	-11.74
Average	-3.82	-3.21	-4.89	1.44	-10.14

Source: Chronicle of Higher Education Almanac

Examining states with incremental funding is slightly more difficult. Most of the other states had incremental funding for most of the five-year period, but a few states switched to performance-based funding toward the end of the period. For that reason, the states of Arkansas, Michigan, and Oklahoma were excluded from the state funding data for the incremental states. The state funding amounts and percent changes for the remaining incremental funding states within the NCA are listed in Table 11, Table 12, and Table 13. During the five year period of

the study, the average state funding amount for incremental states was $952,458,006. The average funding amount per year was $972,832,538 in 2008-2009, $972,314,769 in 2009-2010, $958,912,068 in 2010-2011, $923,052,068 in 2011-2012, and $935,178,629 in 2012-2013. These states decreased for only two years, before rebounding slightly in 2012-2013, However, this group did not decrease in 2009-2010 unlike the other groups.

Table 11

Overall State Funding by Year for States With Incremental Funding Within NCA 2008-2011

State	2008-2009	2009-2010	2010-2011
Arizona	1,227,594,000	1,103,840,000	1,025,534,200
Colorado	802,400,000	830,301,000	765,512,315
Illinois	3,011,705,000	3,133,876,000	3,185,176,200
Iowa	935,161,000	827,395,000	758,772,875
Minnesota	1,576,292,000	1,565,412,000	1,381,065,000
Missouri	1,027,185,000	1,176,136,000	968,935,126
Nebraska	632,901,000	622,962,000	653,935,362
New Mexico	901,770,000	892,950,000	886,623,832
North Dakota	253,901,000	300,891,000	311,678,000
South Dakota	201,521,000	163,122,000	196,616,485
West Virginia	470,705,000	517,837,000	527,395,510
Wisconsin	1,292,042,000	1,191,512,000	1,420,721,709
Wyoming	313,646,000	313,858,000	383,889,743
Total	12,646,823,000	12,640,092,000	12,465,856,357
Average	972,832,538	972,314,769	958,912,027

Source: Chronicle of Higher Education Almanac

The overall percent change during this period within all the states with incremental funding from the first to the last year was -1.86%. This shows that there was an overall slight decrease of roughly 2% in state funding in incremental funding states during this period, which was smaller than the decrease for all states and performance-based funding states discussed previously. Within the 13 states that had incremental funding for the entire period, the average percent change between 2008-2009 and 2009-2010 was -0.08%, while the average percent change between 2009-2010 and 2010-2011 was 1.60%. The average percent change between

2010-2011 and 2011-2012 was -5.80%, and the average percent change between 2011-2012 and 2012-2013 was 2.64%. This had similar results to the values for all states from 2009-2010 to 2010-2011, because there was average positive percent change, but a loss on the average amount given. These values follow the pattern of the data for all states, but with smaller decreases and increases. The incremental states contain all the high and low values for all of the states within the NCA, so it has the same high and low values as listed earlier to describe the values for all the states.

Table 12

Overall State Funding by Year for States With Incremental Funding Within NCA 2011-2013 and State Funding Averages 2008-2013

State	2011-2012	2012-2013	State Average
Arizona	814,457,600	840,320,500	1,002,349,260
Colorado	647,496,274	640,628,978	737,267,713
Illinois	3,585,962,200	3,566,692,200	3,296,682,320
Iowa	739,051,670	787,419,692	809,560,047
Minnesota	1,283,690,000	1,285,247,000	1,418,341,200
Missouri	930,089,844	931,239,665	1,006,717,127
Nebraska	650,437,323	659,571,367	643,961,410
New Mexico	798,972,305	799,405,505	855,944,328
North Dakota	343,964,303	343,805,783	310,848,017
South Dakota	179,516,376	190,251,431	186,205,458
West Virginia	536,382,781	545,760,686	519,616,195
Wisconsin	1,153,558,680	1,182,780,084	1,248,122,895
Wyoming	336,097,525	384,199,290	346,338,112
Total	11,999,676,881	12,157,322,181	12,381,954,084
Average	923,052,068	935,178,629	952,458,006

Source: Chronicle of Higher Education Almanac

The funding trends during the five year from 2008-2013 have varied slightly within the different groups of performance-based funding states and incremental funding states. The states with performance-based funding have had larger decreases in funding than the states with incremental funding, but overall the pattern is pretty similar. The average funding has decreased by roughly 4% during the 5 year period in all states, while performance-based states and

incremental state decreased by roughly 10% and 2% respectively. The state funding from 2009-2012 decreased on average with an average increase in funding for the last year 2012-2013 for all states.

Table 13

Percent Change in State Funding for States With Incremental Funding Within NCA 2008-2013

State	Percent Change 2008-2009 to 2009-2010	Percent Change 2009-2010 to 2010-2011	Percent Change 2010-2011 to 2011-2012	Percent Change 2011-2012 to 2012-2013	Overall Percent Change
Arizona	-10.08	-7.09	-20.58	3.18	-31.55
Colorado	3.48	-7.80	-15.42	-1.06	-20.16
Illinois	4.06	1.64	12.58	-0.54	18.43
Indiana	2.85	-4.43	-1.13	0.38	-2.45
Iowa	-11.52	-8.29	-2.60	6.54	-15.80
Minnesota	-0.69	-11.78	-7.05	0.12	-18.46
Missouri	14.50	-17.62	-4.01	0.12	-9.34
Nebraska	-1.57	4.97	-0.53	1.40	4.21
New Mexico	-0.98	-0.71	-9.89	0.05	-11.35
North Dakota	18.51	3.59	10.36	-0.05	35.41
South Dakota	-19.05	20.53	-8.70	5.98	-5.59
West Virginia	10.01	1.85	1.70	1.75	15.95
Wisconsin	-7.78	19.24	-18.80	2.53	-8.46
Wyoming	0.07	22.31	-12.45	14.31	22.49
Total	-0.05	-1.38	-3.74	1.31	-3.87
Average	-0.08	1.60	-5.80	2.64	-1.86

Source: Chronicle of Higher Education Almanac

Research Question 2

2. To what extent was there a correlation between performance-based funding and both retention rate and graduation rate at public four-year institutions in North Central Association of Colleges and Schools (NCA)?

Data were collected for public four-year higher education institutions within the NCA from Integrated Postsecondary Education Data System (IPEDS) and used to examine both state appropriations and state appropriations per student correlated with four different performance

outcomes commonly used in state performance funding, including full-time retention rate, graduation rate total cohort, graduation rate four year, and graduation rate six year. The data for these variables were collect for all public four-year colleges from Colorado, Indiana, Kansas, Nebraska, Ohio, and Wisconsin available on IPEDS for the five years from 2008-2013. These data were used to calculate correlations for the previously mentioned variables for all states as a whole, for the states with performance-based funding as a whole, for the states with incremental funding as a whole, and for each state individually. All of the correlations were examined for statistical significance using a two-tailed significance test with p-values less than 0.05 considered statistically significant.

Table 14

Correlation Between State Appropriations and Performance Outcomes for All States in Study

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations	0.601	0.583	0.555	0.588
P-Value	<0.001	<0.001	<0.001	<0.001
n	414	424	414	414

First, the overall correlations for all states were examined to see the correlation between state appropriations and the four performance outcomes. These correlation values are presented in Table 14. The correlation between state appropriations and all four performance variables were statistically significant. The correlation between state appropriations and full-time retention rate was $r = 0.601$, while the correlation between state appropriations and graduation rate total cohort was $r = 0.583$. The correlation between state appropriations and graduation rate four year was $r = 0.555$, and the correlation between state appropriations was $r = 0.588$. All four of these correlations had a p-value of <0.001 and are statistically significant regardless of significance

level. This shows that there was a correlation between state appropriations and all four performance outcomes overall for the six states taken together.

Table 15

Correlation Between State Appropriations per Student and Performance Outcomes for All States in Study

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations per Student	0.351	0.396	0.320	0.393
P-Value	<0.001	<0.001	<0.001	<0.001
n	414	424	414	414

In order to control for different institutional sizes, the correlations between state appropriations per student and the four performance outcomes were also calculated and presented in Table 15. When controlling for different amounts of students, the correlation values decreased, but they were still statistically significant. For the five years of the study for all the states together, the correlation between state appropriations per student and full-time retention was $r = 0.351$, the correlation between state appropriations per student and graduation rate total cohort was $r = 0.396$, the correlation between state appropriations per student and graduation rate four year was $r = 0.320$, and the correlation between state appropriations per student and graduation rate six year was $r = 0.393$. While these values were smaller, they were all still statistically significant with p-values of <0.001. The strength of the correlation appears to lessen because of the lower correlation value, but it still has a strong statistical significance, so there is a correlation between state appropriations and all four performance outcomes.

The strength of the correlation needed to be examined for the states with performance-based funding as a whole to see if funding within these states was correlated to the four performance outcomes. For this purpose, the data from Indiana, Kansas, and Ohio were

examined as a whole and presented in Table 16 for comparison of state appropriations with the four performance outcomes and in Table 18 for comparison of state appropriations per student with the four performance outcomes. The incremental states of Colorado, Nebraska, and Wisconsin were also examined as a whole and presented in Table 17 for comparison of state appropriations with the four performance outcomes and in Table 19 for comparison of state appropriations per student with the four performance outcomes to use for comparison.

Table 16

Correlation Between State Appropriations and Performance Outcomes for All States With Performance-based Funding in Study

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations	0.744	0.733	0.648	0.752
P-Value	<0.001	<0.001	<0.001	<0.001
n	264	274	264	264

Table 17

Correlation Between State Appropriations and Performance Outcomes for All States With Incremental Funding in Study

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations	0.516	0.499	0.461	0.500
P-Value	<0.001	<0.001	<0.001	<0.001
n	150	150	150	150

Within states with performance-based funding the correlation values were larger than the correlation values in states with incremental funding. However, the correlations for both types of funding were statistically significant, which means that they both have a strong correlation. For performance-based funding states from 2008-2013 the correlation between state appropriations and full-time retention rate was $r = 0.744$ compared to $r = 0.516$ in states with incremental

funding. The correlation between state appropriations and graduation rate total cohort was $r = 0.733$ compared to $r = 0.499$ in states with incremental funding. The correlation between state appropriations and graduation rate four year was $r = 0.648$ compared to $r = 0.461$ in states with incremental funding. The correlation between state appropriations and graduation rate six year was $r = 0.752$ compared to $r = 0.500$ in states with incremental funding. In all eight cases, these correlation were statistically significant with p-values of <0.001. Despite larger correlation values for states with performance-based funding, the correlations for the states with incremental funding are also statistical significant. There is a strong correlation within both funding systems between state appropriations and all four performance outcomes. States with performance-based funding have statistically significant correlations with all four performance outcomes, but it could not be stated that these correlations were more statistically significant than the correlations in the states with incremental funding.

Table 18

Correlation Between State Appropriations per Student and Performance Outcomes for All States With Performance-based Funding in Study

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations per Student	0.526	0.592	0.502	0.610
P-Value	<0.001	<0.001	<0.001	<0.001
n	264	274	264	264

When the different types are controlled for the size of institution by using state appropriations per student, the correlation values decrease for both performance-based funding states as a whole and incremental funding states as a whole. For performance-based funding states from 2008-2013 the correlation between state appropriations per student and full-time retention rate was $r = 0.526$ compared to $r = 0.362$ in states with incremental funding. The

correlation between state appropriations per student and graduation rate total cohort was $r = 0.592$ compared to $r = 0.397$ in states with incremental funding. The correlation between state appropriations per student and graduation rate four year was $r = 0.502$ compared to $r = 0.220$ in states with incremental funding. The correlation between state appropriations per student and graduation rate six year was $r = 0.610$ compared to $r = 0..395$ in states with incremental funding. Seven of the correlation were statistically significant with p-values of <0.001, and the other correlation between state appropriations per student and graduation rate four year within states with incremental funding was statistically significant with a p-value of 0.007. Comparing the correlations for state appropriations per student and the four performance outcomes showed larger correlation values for states that use performance-based funding, but states with incremental funding still had correlations that were statistically significant. States with performance based funding were correlated strongly between state appropriations per student and all four performance outcomes, but it could not be asserted that it is a stronger correlation than the states with incremental funding.

Table 19

Correlation Between State Appropriations per Student and Performance Outcomes for All States With Incremental Funding in Study

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations per Student	0.362	0.397	0.220	0.395
P-Value	<0.001	<0.001	0.007	<0.001
n	150	150	150	150

The correlations were computed with regards to all states and type of funding, so the next step was to examine the correlations within the paired states. The same correlations were examined for each of the three pairs. The first pairing examined was the performance-based state

of Indiana and the incremental state of Colorado, which are presented in Table 20 and Table 21. The data compiled for these states showed that Colorado did not have any significant correlation values, while Indiana has strong correlation for both state appropriations with all four performance outcomes and state appropriations per student with all four performance outcomes. After this result was examined, it was apparent that there were data points that were skewing the Colorado data.

Table 20

Correlation Between State Appropriations and Performance Outcomes for Colorado and Indiana

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Colorado				
State Appropriations	0.186	0.097	-0.053	0.094
P-Value	0.155	0.463	0.687	0.473
n	60	60	60	60
Indiana				
State Appropriations	0.855	0.849	0.787	0.859
P-Value	<0.001	<0.001	<0.001	<0.001
n	70	70	70	70

Table 21

Correlation Between State Appropriations per Student and Performance Outcomes for Colorado and Indiana

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Colorado				
State Appropriations per Student	0.182	0.087	-0.063	0.084
P-Value	0.163	0.511	0.631	0.522
n	60	60	60	60
Indiana				
State Appropriations per Student	0.583	0.702	0.617	0.713
P-Value	<0.001	<0.001	<0.001	<0.001
n	70	70	70	70

According to IPEDS, only 3 Colorado institutions received in state appropriations from 2008-2013. The remaining state school received $0 in state appropriations, which skewed the results of the correlation. These values were removed and the correlation was computed using only the three schools that received state appropriations according to IPEDS. The correlations for Colorado were computed again and presented with Indiana's correlations in Table 22 and Table 23. These correlation were strong statistically significant negative correlations, but for a data set containing only 11 values. This would show that within Colorado there is a negative correlation between state appropriations and all four performance outcomes, which means that increasing the amount of funding correlates to decreases in performance outcomes.

Table 22

Correlation Between State Appropriations and Performance Outcomes for Colorado and Indiana with Outliers Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Colorado				
State Appropriations	-0.920	-0.969	-0.981	-0.969
P-Value	<0.001	<0.001	<0.001	<0.001
n	11	11	11	11
Indiana				
State Appropriations	0.855	0.849	0.787	0.859
P-Value	<0.001	<0.001	<0.001	<0.001
n	70	70	70	70

Table 23

Correlation Between State Appropriations per Student and Performance Outcomes for Colorado and Indiana With Outliers Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Colorado				
State Appropriations per Student	-0.920	-0.969	-0.981	-0.969
P-Value	<0.001	<0.001	<0.001	<0.001
n	11	11	11	11
Indiana				
State Appropriations per Student	0.583	0.702	0.617	0.713
P-Value	<0.001	<0.001	<0.001	<0.001
n	70	70	70	70

Comparing the values presented in Colorado shows that the values reported are not comparable to the values for the other state. The average amount of state funding shown in Table 6 for Colorado was $737,267,713, but the averages amount of state appropriations for all schools together from the IPEDS data was $20,203,493.20. In Table 24 the average state appropriations

per student is shown for comparison. Colorado averages $387.74 in state appropriations per student while the other states range from $3,212.08 to 6,088.62. Colorado must disperse funding in a way not classified as state appropriations in IPEDS. Due to the disparity in how Colorado state appropriations were reported compared to the other states in the study, it was removed. Since the state was compared with similar states, it became necessary to remove Indiana as well.

Table 24

Average State Appropriations per Student 2008-2013 for States in Study

	Colorado	Indiana	Kansas	Nebraska	Ohio	Wisconsin
Average State Appropriations per Student	387.74	4,469.75	5,021.20	6,088.62	3,212.08	4,191.27

With Colorado and Indiana removed it became necessary to reexamine the overall correlations and the correlations grouped by type of funding. The correlation for state appropriations and state appropriations per student with the four performance outcomes are presented in Table 25 and Table 26. The removal of the two states increased the correlation values for state appropriations with all four performance outcomes and also increased the correlation values for state appropriations per student with all four performance outcomes. All eight of the overall correlations are still statistically significant with p-values of <0.001.

Table 25

Correlation Between State Appropriations and Performance Outcomes for All States With Colorado and Indiana Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations	0.640	0.630	0.616	0.639
P-Value	<0.001	<0.001	<0.001	<0.001
n	284	284	284	284

Table 26

Correlation Between State Appropriations per Student and Performance Outcomes for All States With Colorado and Indiana Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations per Student	0.484	0.526	0.494	0.548
P-Value	<0.001	<0.001	<0.001	<0.001
n	284	284	284	284

Since there are now only four states, the correlation for each type also changed. The correlations for all states with performance-based funding grouped together is presented in Table 27 and Table 29, while the correlations for all states with incremental funding grouped together is presented in Table 28 and Table 30. With the removal of Indiana from the States with performance-based funding, the correlations decreased slightly for all four values. The correlation values for the states with incremental funding increased in some cases and decreased in others.

Table 27

Correlation Between State Appropriations and Performance Outcomes for All States With Performance-based Funding in Study with Indiana Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations	0.702	0.704	0.611	0.729
P-Value	<0.001	<0.001	<0.001	<0.001
n	194	194	194	194

Table 28

Correlation Between State Appropriations and Performance Outcomes for All States With Incremental Funding in Study with Colorado Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations	0.655	0.602	0.691	0.602
P-Value	<0.001	<0.001	<0.001	<0.001
n	90	90	90	90

The two states with performance-based funding, Indiana and Ohio, have higher correlation values as group when correlating state appropriations with the four performance outcomes than the two states with incremental funding as a group. With the performance-based funding states the correlation between state appropriations and full-time retention rate was $r = 0.702$ with a p-value of <0.001 compared to $r = 0.655$ with a p-value of <0.001 for the incremental states. The correlation between state appropriations and graduation rate total cohort for performance-based funding states was $r = 0.704$ with a p-value of <0.001 compared to $r = 0.602$ with p-value <0.001 for incremental states. State appropriations correlates with graduation rate four year at $r = 0.611$ with a p-value of <0.001 for performance states compared to $r = 0.691$ with a p-value of <0.001 in incremental states. The performance-based states also correlate state appropriations with graduation rate six year at $r = 0.729$ with a p-value of <0.001 compared to $r = 0.602$ with a p-value of <0.001 for incremental states. States that use both types of funding have statistically significant correlation between state appropriations and all four performance outcomes.

The performance-based states have higher correlations when correlating state appropriations to full-time retention rate, graduation rate total cohort, and graduation rate six year. However, incremental states had a higher correlation when correlating state appropriations

to graduation rate four year. States with performance-based funding have higher correlation values for three of the performance outcomes when correlated with state appropriations, but states with incremental funding have a higher correlation value for graduation rate four year and are also statistically significant. For these reasons, it cannot be said that states with performance-based funding are more strongly correlated between state appropriations and performance outcomes than states with incremental funding. These results do show a statistically significant positive correlation between state appropriations and all four performance outcomes in states than use performance-based funding.

Table 29

Correlation Between State Appropriations per Student and Performance Outcomes for All States With Performance-based Funding in Study With Indiana Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations per Student	0.495	0.570	0.490	0.602
P-Value	<0.001	<0.001	<0.001	<0.001
n	194	194	194	194

Table 30

Correlation Between State Appropriations per Student and Performance Outcomes for All States With Incremental Funding in Study With Colorado Removed

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
State Appropriations per Student	0.291	0.275	0.462	0.275
P-Value	0.005	0.009	<0.001	0.009
n	90	90	90	90

The previous examination looked at overall state appropriations in comparison with the performance outcomes, but that does not account for the difference in the size of institutions. For

that reason it is important to correlate the state appropriations per student with the four performance outcomes. Both the states using performance-based funding and the states using incremental funding have statistically significant correlations between state appropriations per student and all four performance outcomes. The correlation between state appropriations per student and full-time retention is $r = 0.495$ for performance-based funding states with a p-value of <0.001 compared to a correlation value of 0.291 for incremental states with a p-value of 0.005.

State appropriations per student correlates with graduation rate total cohort in states with performance-based funding at a value of 0.570 with a p-value of <0.001 compared to 0.275 for incremental states with a p-value of 0.009. In states with performance-based funding the correlation between state appropriations per student and graduation rate four year was $r = 0.490$ with a p-value of <0.001 compared to $r = 0.462$ in incremental states with a p-value of <0.001. Finally, state appropriations per student correlated to graduation rate six year within states with performance-based funding was $r = 0.602$ with a p-value of <0.001 compared to $r = 0.275$ with a p-value of 0.009 in states with incremental funding. When comparing performance-based funding states with incremental states for state appropriations per student correlated with the four performance outcomes, it appears that there is a higher correlation in states with performance-based funding, but incremental states are also statistically significant. Since both are statistically significant it cannot be said that one is better than the other, but it can be said that state appropriations per student has a statistically significant correlation to full-time retention rate, graduation rate total cohort, graduation rate four year, and graduation rate six year in state with performance-based funding.

Table 31

Correlation Between State Appropriations and Performance Outcomes for Kansas and Nebraska

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Kansas				
State Appropriations	0.825	0.851	0.637	0.874
P-Value	<0.001	<0.001	<0.001	<0.001
n	35	35	35	35
Nebraska				
State Appropriations	0.761	0.733	0.497	0.733
P-Value	<0.001	<0.001	0.011	<0.001
n	25	25	25	25

States with performance-based funding have been examined as a whole, but now the performance states need to be compared with the corresponding paired state. A comparison of Kansas and Nebraska for the same correlations will help to provide clarity with the use of similar states. Kansas has performance-based funding in its state funding model, while Nebraska did not use performance-based funding during the period of the study. The correlation between state appropriations and the four performance out comes for Kansas and Nebraska are listed in Table 31. Kansas has a correlation between state appropriations and full-time retention rate of $r = 0.825$ compared to $r = 0.761$ for Nebraska. The state appropriations correlated with graduation rate total cohort was $r = 0.851$ in Kansas compared to $r = 0.733$ in Nebraska. When state appropriations was correlated with graduation rate four year in Kansas the correlation value was $r = 0.637$ compared to $r = 0.497$ in Nebraska. Last, state appropriations in Kansas correlated with graduation rate six year at $r = 0.874$ compared to $r = 0.733$ in Nebraska. All of the correlation values for both state were statistically significant, but the state appropriations correlated with graduation rate four year in Nebraska had p-value of 0.011. This is significant when using a significance level of 0.05, but would not be significant if the significance level was

0.01. Kansas has higher correlation values than Nebraska, but Nebraska still had statistically significant correlation values. Kansas does have a statistically significant correlation between state appropriations and all four performance outcomes. Due to the small sample size for Nebraska, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

Table 32

Correlation Between State Appropriations per Student and Performance Outcomes for Kansas and Nebraska

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Kansas				
State Appropriations per Student	0.890	0.828	0.731	0.856
P-Value	<0.001	<0.001	<0.001	<0.001
n	35	35	35	35
Nebraska				
State Appropriations per Student	0.605	0.736	0.764	0.736
P-Value	0.001	<0.001	<0.001	<0.001
n	25	25	25	25

State appropriations per student was correlated to the four performance outcomes in Kansas and Nebraska to adjust for differences in the size of institutions. These values were listed in Table 32. Both of these state have statistically significant correlations between state appropriations per student and all four performance outcomes. In Kansas state appropriations per student correlates to full-time retention rate at $r = 0.890$ compared to $r = 0.605$ in Nebraska. State appropriations per student correlates to graduation rate total cohort in Kansas at $r = 0.828$ compared to r =0.736 in Nebraska. The correlation between state appropriations per student and graduation rate four year is $r = 0.731$ in Kansas compared to $r = 0.764$ in Nebraska. The state

appropriations per student in Kansas correlates to graduation rate six year at r =0.856 compared to $r = 0.736$ in Nebraska. All of these correlations have a p-value of <0.001, so all of the correlations are statistically significant. Kansas does have higher correlation values for full-time retention rate, graduation rate total cohort, and graduation rate six year, but Nebraska has a higher correlation for graduation rate four year. Kansas has a statistically significant correlation between state appropriations per student and all four performance outcomes. Due to the small sample size of Nebraska, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

Table 33

Correlation Between State Appropriations and Performance Outcomes for Ohio and Wisconsin

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Ohio				
State Appropriations	0.692	0.689	0.610	0.720
P-Value	<0.001	<0.001	<0.001	<0.001
n	169	159	159	159
Wisconsin				
State Appropriations	0.644	0.585	0.739	0.585
P-Value	<0.001	<0.001	<0.001	<0.001
n	65	65	65	65

After comparing Kansas and Nebraska, a comparison of Ohio and Wisconsin for the same correlations will help to provide more clarity with the use of similar states. Ohio used a Performance-based funding in its state funding model, while Wisconsin did not use performance-based funding as a part of its state funding model during the period of the study. The correlations between state appropriations and the four performance out comes for Ohio and Wisconsin are listed in Table 33. For Ohio the correlation between state appropriations and full-time retention rate of $r = 0.692$ compared to $r = 0.644$ for Wisconsin. State appropriations correlated with

graduation rate total cohort was $r = 0.689$ in Ohio compared to $r = 0.585$ in Wisconsin. The correlation value was $r = 0.610$ when correlating state appropriations with graduation rate four year in Ohio compared to $r = 0.739$ in Wisconsin. State appropriations in Ohio correlated with graduation rate six year at $r = 0.720$ compared to $r = 0.585$ in Wisconsin. All of the correlation values for both state were statistically significant with p-values of <0.001. Ohio has higher correlation values than Wisconsin for three of the correlations, but Wisconsin was still had statistically significant correlation values. Ohio had a smaller correlation than Wisconsin for state appropriations correlated with graduation rate four year, but it was still statistically significant. Ohio does have a statistically significant correlation between state appropriations and all four performance outcomes.

Table 34

Correlation Between State Appropriations per Student and Performance Outcomes for Ohio and Wisconsin

	Full-time Retention Rate	Graduation Rate Total	Graduation Rate Four Year	Graduation Rate Six Year
Ohio				
State Appropriations per Student	0.407	0.523	0.454	0.550
P-Value	<0.001	<0.001	<0.001	<0.001
n	169	159	159	159
Wisconsin				
State Appropriations per Student	0.305	0.241	0.477	0.241
P-Value	0.013	0.053	<0.001	0.053
n	65	65	65	65

State appropriations per student was also correlated to the four performance outcomes in Ohio and Wisconsin to adjust for differences in the size of institutions. These values were reported in Table 34. In Ohio the correlation between state appropriations and full-time retention

rate was $r = 0.407$ compared to $r = 0.305$ in Wisconsin. State appropriations per student correlates to graduation rate total cohort at $r = 0.523$ in Ohio compared to $r = 0.241$ in Wisconsin. State appropriations per student and graduation rate four year in Ohio had a correlation value of $r = 0.454$ compared to $r = 0.477$ in Wisconsin. The state appropriations per student in Ohio correlates to graduation rate six year at $r = 0.550$ compared to $r = 0.241$ in Wisconsin. All of the correlations for Ohio have a p-value of <0.001, so all of these correlations were statistically significant. For Wisconsin state appropriations per student correlated with graduation rate four year has a p-value of <0.001, but the other correlations are not as statistically significant. The correlation between state appropriations per student and full-time retention rate has a p-value of 0.013 which was statistically significant when using a significance level of 0.05, but is not significant for a significance level of 0.01. The correlations for both state appropriations per student with graduation rate total cohort and state appropriations per student with graduation rate six year have p-values of 0.053, which are not significant for either significance levels of 0.01 or 0.05. Ohio has higher correlations for full-time retention rate, graduation rate total cohort, and graduation rate six year, but Wisconsin has a higher correlation for graduation rate four year. Since the correlations for Wisconsin are not significant for graduation rate total cohort and graduation rate six year, Ohio has a stronger correlation for those performance outcomes. Overall, Ohio has statistically significant correlations between state appropriations per student and all four performance outcomes.

The previous correlations have all used data from the same years to examine correlations between variables, but it is important to see if there is a correlation between the state appropriations and the outcomes that performance-based funding models are trying to influence. Comparing state appropriations for certain year with the full-time retention rate for the next year

will help to show if there is a relationship between these two values. For example the state appropriations for 2008-2009 can be compared to full-time retention rate for 2009-2010. All possible comparisons of this type were examined for the states included in the study for 2008-2013. This correlation will be referred to as the retention rate lag correlation. A similar comparison can be done for graduation rate four year. All four years' worth of state appropriations were correlated with the corresponding graduation rate four year to compare all possible funding that could have influenced the graduation rate four year. For example the total amount of state appropriations from 2008-2009, 2009-2010, 2010-2011, and 2011-2012 were correlated with graduation rate four year for 2011-2012. All available comparisons for 2008-2013 were correlated in this manner. This will be referred to as the graduation rate lag correlation. As mentioned earlier, Colorado's data had statistical issues, so both Colorado and Indiana will be excluded from these two correlations.

Table 35

Correlation Between State Appropriations and Subsequent Retention Rate for All States With Colorado and Indiana Removed

	Retention Rate Subsequent Year
State Appropriations	0.644
P-value	<0.001
n	228

Table 36

Correlation Between State Appropriations per Student and Subsequent Retention Rate for All States With Colorado and Indiana Removed

	Retention Rate Subsequent Year
State Appropriations per Student	0.512
P-value	<0.001
n	228

The retention rate lag correlation for all four states together will be explored first in Table 35 and Table 36. The correlation for state appropriations with the retention rate lag was $r = 0.644$ with a p-value of <0.001 and the correlation for state appropriations per student with the retention rate lag was $r = 0.512$ with a p-value of <0.001. Overall the four states had a statistically significant correlation to the retention lag for both state appropriations and state appropriations per student.

Table 37

Correlation between State Appropriations and Subsequent Retention Rate for All States With Performance-based Funding in Study with Indiana Removed

	Retention Rate Subsequent Year
State Appropriations	0.711
P-value	<0.001
n	156

Table 38

Correlation Between State Appropriations and Subsequent Retention Rate for All states With Incremental Funding in Study with Colorado Removed

	Retention Rate Subsequent Year
State Appropriations	0.660
P-value	<0.001
n	72

Overall there was a strong correlation for the retention rate lag, so an exploration of the correlations for retention rate lag was performed for states with each type of funding and presented in Table 37 and Table 38. The correlation between state appropriations and the retention rate lag for states with performance-based funding was $r = 0.711$ compared to $r = 0.660$ for states with incremental funding. States with performance-based funding had a higher correlation than states with incremental funding, but both types had a statistically significant p-value of <0.001. States with Performance-based funding had statistically significant correlation

between state appropriations and the subsequent year's full-time retention rate, but it could not be considered stronger than the correlations for incremental states.

The correlation for state appropriations per student with the subsequent year's full-time retention rate was explored next in Table 39 and Table 40. State appropriations per student correlated with the retention rate lag for states with performance-based funding yielded a correlation rate of $r = 0.521$ compared to $r = 0.315$ for states with incremental funding. Performance-based funding states had slightly higher correlations for incremental states, but both were statistically significant with the p-value for performance-based funding states at <0.001 and incremental states at 0.007. State appropriations per student correlated with the full-time retention rate lag was statistically significant in states with performance-based funding. However, the states with incremental funding also had statistically significant correlations, so the correlations for performance states could not be considered necessarily stronger.

Table 39

Correlation Between State Appropriations per Student and Subsequent Retention Rate for All States with Performance-based Funding in Study with Indiana Removed

	Retention Rate Subsequent Year
State Appropriations per Student	0.521
P-value	<0.001
n	156

Table 40

Correlation Between State Appropriations per Student and Subsequent Retention Rate for All States With Incremental Funding in Study With Colorado Removed

	Retention Rate Subsequent Year
State Appropriations per Student	0.315
P-value	0.007
n	72

The correlations for the paired states were examined next to ascertain the correlation between similar states from the two types. Kansas represented the states with performance-based funding and it was compared with Nebraska which did not use performance-based funding. These are presented in Table 41 and Table 42. Kansas has a correlation value of $r = 0.830$ when correlating state appropriations with retention rate lag compared to $r = 0.787$ for Nebraska. Both states had p-values of <0.001, so they are both statistically significant correlation. Kansas had a higher correlation, but Nebraska was also statistically significant. State appropriations per student correlates with retention rate lag at $r = 0.901$ in Kansas compared to $r = 0.625$ in Nebraska. Both states were statistically significant with Kansas having a p-value of <0.001 and Nebraska having a p-value of 0.003. Kansas had a higher correlation, but Nebraska is also statistically significant. Kansas had a statistically significant for both state appropriations and state appropriations per student when correlated with full-time retention rate for the subsequent year. Both states were statistically significant, but, due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

Table 41

Correlation Between State Appropriations and Subsequent Retention Rate for Kansas and Nebraska

	Retention Rate Subsequent Year
Kansas	
State Appropriations	0.830
P-value	<0.001
n	28
Nebraska	
State Appropriations	0.787
P-value	<0.001
n	20

Table 42

Correlation Between State Appropriations per Student and Subsequent Retention Rate for Kansas and Nebraska

	Retention Rate Subsequent Year
Kansas	
State Appropriations per Student	0.901
P-value	<0.001
n	28
Nebraska	
State Appropriations per Student	0.625
P-value	0.003
n	20

The correlations for the next set of paired states was examined next. Ohio represented the states with performance-based funding and it was compared with Wisconsin which did not use performance-based funding. These were presented in Table 43 and Table 44. Ohio has a correlation value of $r = 0.702$ when correlating state appropriations with retention rate lag compared to $r = 0.642$ for Wisconsin. Both states had p-values of <0.001, so they are both statistically significant correlation. Ohio had a higher correlation, but Wisconsin was also statistically significant. State appropriations per student correlates with retention rate lag at $r = 0.434$ in Ohio compared to $r = 0.332$ in Wisconsin. Ohio were statistically significant with a p-value of <0.001, but Wisconsin had a p-value of 0.016. Wisconsin's correlation was statistically significant for a significance level of 0.05, but was not statistically significant for a significance level of 0.01. Ohio had a higher correlation, but Wisconsin is also statistically significant with a significance of 0.05. If compared with a significance of 0.01, then Ohio would have a better correlation. Ohio had a statistically significant for both state appropriations and state appropriations per student when correlated with full-time retention rate for the subsequent year.

Table 43

Correlation Between State Appropriations and Subsequent Retention Rate for Ohio and Wisconsin

	Retention Rate Subsequent Year
Ohio	
State Appropriations	0.702
P-value	<0.001
n	128
Wisconsin	
State Appropriations	0.642
P-value	<0.001
n	52

Table 44

Correlation Between State Appropriations per Student and Subsequent Retention Rate for Ohio and Wisconsin

	Retention Rate Subsequent Year
Ohio	
State Appropriations per Student	0.434
P-value	<0.001
n	128
Wisconsin	
State Appropriations per Student	0.332
P-value	0.016
n	52

With the completion of the retention rate lag correlation, the graduation rate lag correlation for all four states together will be explored first. These correlations are presented in Table 45 and Table 46. The correlation for state appropriations with the graduation rate lag was $r = 0.657$ with a p-value of <0.001, and the correlation for state appropriations per student with the graduation rate lag was $r = 0.517$ with a p-value of <0.001. Overall the four states had a statistically significant correlation to the graduation rate lag for both state appropriations and state appropriations per student.

Table 45

Correlation Between State Appropriations (Four Year Total) and Graduation Rate Four Year for All States With Colorado and Indiana Removed

	Graduation Rate Four Year
State Appropriations	0.657
P-value	<0.001
n	114

Table 46

Correlation Between State Appropriations per Student (Four Year Total) and Graduation Rate Four Year for All States With Colorado and Indiana Removed

	Graduation Rate Four Year
State Appropriations per Student	0.517
P-value	<0.001
n	114

Overall there was a strong correlation for the graduation rate lag, so an exploration of the correlations for graduation rate lag was performed for states with each type of funding and presented in Table 47 and Table 48. The correlation between state appropriations and the graduation rate lag for states with performance-based funding was $r = 0.657$ compared to $r = 0.709$ for states with incremental funding. States with performance-based funding had a higher correlation than states with incremental funding, but both types had a statistically significant p-value of <0.001. States with performance-based funding had statistically significant correlation between state appropriations over the four years and the graduation rate four year that corresponds to those years.

Table 47

Correlation Between State Appropriations (Four Year Total) and Graduation Rate Four Year for All States With Performance-based Funding in Study With Indiana Removed

	Graduation Rate Four Year
State Appropriations	0.657
P-value	<0.001
n	78

Table 48

Correlation Between State Appropriations (Four Year Total) and Graduation Rate Four Year for All States With Incremental Funding in Study With Colorado Removed

	Graduation Rate Four Year
State Appropriations	0.709
P-value	<0.001
n	36

The correlation for state appropriations per student for the four years with the graduation rate four year was explored next in Table 49 and Table 50. State appropriations per student correlated with the graduation rate lag for states with performance-based funding yielded a correlation rate of $r = 0.526$ compared to $r = 0.457$ for states with incremental funding. Performance-based funding states had slightly higher correlations for incremental states, but both were statistically significant with the p-value for performance-based funding states at <0.001 and incremental states at 0.005. State appropriations per student for the corresponding four years was correlated with the graduation rate four year and was statistically significant in states with performance-based funding states.

Table 49

Correlation Between State Appropriations per Student and (Four Year Total) and Graduation Rate Four Year for All States With Performance-based Funding in Study With Indiana Removed

	Graduation Rate Four Year
State Appropriations per Student	0.526
P-value	<0.001
n	78

Table 50

Correlation Between State Appropriations per Student (Four Year Total) and Graduation Rate Four Year for All States With Incremental Funding in Study With Indiana Removed

	Graduation Rate Four Year
State Appropriations per Student	0.457
P-value	0.005
n	36

The correlations for the paired states were examined determine the correlation between similar states from the two types. Kansas represented the states with performance-based funding and it was compared with Nebraska, which did not use performance-based funding. This correlation was computed to compare these two states, but because of the nature of the correlation there was only 14 data points for Kansas and 10 for Nebraska. These correlations are presented in Table 51 and Table 52. Kansas has a correlation value of $r = 0.868$ when correlating state appropriations with graduation rate lag compared to $r = 0.593$ for Nebraska. Kansas had p-values of <0.001 and was statistically significant, but Nebraska had a p-value of 0.071 and is not statistically significant. Kansas had a higher correlation than Nebraska and Nebraska is not statistically significant. State appropriations per student correlates with graduation rate lag at $r = 0.917$ in Kansas compared to $r = 0.845$ in Nebraska. Both states were statistically significant with Kansas having a p-value of <0.001 and Nebraska having a p-value of 0.002. Kansas had a higher correlation, but Nebraska is also statistically significant. Kansas had

a statistically significant for both state appropriations and state appropriations per student over four years when correlated with the corresponding graduation rate four year. Due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

Table 51

Correlation Between State Appropriations (Four Year Total) and Graduation Rate Four Year for Kansas and Nebraska

	Graduation Rate Four Year
Kansas	
State Appropriations	0.868
P-value	<0.001
n	14
Nebraska	
State Appropriations	0.593
P-value	0.071
n	10

Table 52

Correlation Between State Appropriations per Student (Four Year Total) and Graduation Rate Four Year for Kansas and Nebraska

	Graduation Rate Four Year
Kansas	
State Appropriations per Student	0.917
P-value	<0.001
n	14
Nebraska	
State Appropriations per Student	0.845
P-value	0.002
n	10

The next pair of states was Ohio and Wisconsin. Ohio represented the states with performance-based funding and it was compared with Wisconsin, which did not use performance-based funding. Wisconsin only has a sample size of 26, which could be problematic

for drawing statistical conclusions. These correlations were presented in Table 53 and Table 54 Ohio has a correlation value of $r = 0.644$ when correlating state appropriations with retention rate lag compared to $r = 0.748$ for Wisconsin. Both states had p-values of <0.001, so they are both statistically significant correlation. Ohio had a higher correlation, but Wisconsin was also statistically significant. State appropriations per student correlates with retention rate lag at $r = 0.494$ in Ohio compared to $r = 0.471$ in Wisconsin. Ohio were statistically significant with a p-value of <0.001, but Wisconsin had a p-value of 0.015. Wisconsin's correlation was statistically significant for a significance level of 0.05, but was not statistically significant for a significance level of 0.01. Ohio had a higher correlation, but Wisconsin is also statistically significant with a significance of 0.05. If compared with a significance of 0.01, then Ohio would have a better correlation. Ohio had a statistically significant for both state appropriations and state appropriations per student when correlated with full-time retention rate for the subsequent year. Due to the small sample size of Wisconsin, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

Table 53

Correlation Between State Appropriations (Four Year Total) and Graduation Rate Four Year for Ohio and Wisconsin

	Graduation Rate Four Year
Ohio	
State Appropriations	0.644
P-value	<0.001
n	64
Wisconsin	
State Appropriations	0.748
P-value	<0.001
n	26

Table 54

Correlation Between State Appropriations per Student (Four Year Total) and Graduation Rate Four Year for Ohio and Wisconsin

	Graduation Rate Four Year
Ohio	
State Appropriations per Student	0.494
P-value	<0.001
n	64
Wisconsin	
State Appropriations per Student	0.471
P-value	0.015
n	26

The large number of correlations enumerated were used to explore the correlations between performance-based funding and both retention rate and graduation rate. If the precise amount given for performance were available from a similar source, then a correlation could be computed using the precise amount. However, this information was not available, so the overall funding amount was used and compared to a similar state with incremental funding. This would show if state funding was correlated with the four performance outcomes and if this correlation was stronger in states with a particular funding type.

Question two focused on the correlation between performance-based funding and both retention rate and graduation rate. In states with performance-based funding, all of the correlations for full-time retention rate were statistically significant. However, all of the correlations for states with incremental funding were statistically significant regardless of significance level, except for the correlation between state appropriations per student and full-time retention rate in Wisconsin. It had a p-value of 0.013, which would only be significant with a significance level of 0.05. Full-time retention was also explored using a retention lag correlation. This allows for a comparison of funding that leads to retention the following year.

For the correlations with full-time retention rate lag, performance states had statistically significant correlations for all of the different comparisons. The incremental states had statistically significant correlations for all of the values, except for the correlation between state appropriation per student and retention rate lag in Wisconsin. This correlation had a p-value of 0.016, which is only significant for a significance level of 0.05. States with performance-based funding had a higher correlation with full-time retention rate than in states with incremental funding, but with the statistical significance of almost all the correlations for both types it could not concluded that states with performance-based funding were more strongly correlated with full-time retention rate.

Graduation rate was often used as a mechanism in performance-based funding models, but different states used different graduation rates. For this reason, the correlations for three different graduation rates were explored. The three graduation rates were graduation rate total cohort, graduation rate four year, and graduation rate six year. In states with performance-based funding, all of the correlations for all three graduation rates were statistically significant regardless of significance level. All of the correlations for the states with incremental funding were statistically significant, except for two in Wisconsin. The graduation rate total cohort and graduation rate six year for Wisconsin did not have statistically significant correlations with state appropriation per student. Ohio, which is a performance-based funding state, had a stronger correlation than Wisconsin for these two graduation rates. The graduation rate lag was also examined. The graduation rate lag used all four years of funding to compare to the four year graduation rate. The graduation rate lag had statistically significant correlations in the performance states for all of the different correlations. The incremental states were significant for all of the states, except state appropriation per student correlated with graduation rate lag in

Wisconsin. It had a p-value of 0.015, which is only significant with a significance level of 0.05. The correlations for Ohio, which used performance-based funding, with graduation rate lag were lower than the correlations for Wisconsin, which used incremental funding. States with performance-based funding had a statistically significant correlation with graduation rate and was stronger in a couple of instances; but with the statistical significance of almost all the correlations for both types, it could not concluded with certainty that states with performance-based funding were more strongly correlated with graduation rate.

Research Question 3

3. To what extent was there a correlation between incremental funding and both retention rate and graduation rate at public four-year institutions in North Central Association of Colleges and Schools (NCA)?

The same correlations used for question two were examined again with the focus on states with incremental funding. State appropriations and state appropriations per student were both correlated with full-time retention rate, graduation rate total cohort, graduation rate four year, and graduation rate six year. Due to the inconsistencies explained for Colorado in question two, Colorado and Indiana will be excluded from the correlations in this question. Kansas, Nebraska, Ohio, and Wisconsin were used to explore the same correlations examined in question two. The overall correlations for all four states together were listed in Table 25 and Table 26.

All of the correlation for the states as a whole for the years of 2008-2013 were statistically significant. The correlation between state appropriations and full-time retention rate was $r = 0.640$ with a p-value of <0.001. State appropriations had a correlation for $r = 0.630$ and a p-value of <0.001 for Graduation rate total cohort. The state appropriations was correlated with graduation rate four year at $r = 0.616$ with a p-value of <0.001 and it was correlated with

graduation rate six year at $r = 0.639$ with a p-value of <0.001. When the same performance outcomes were correlated with state appropriations per student, they were also statistically significant. State appropriations per student correlated with full-time retention rate at $r = 0.484$, graduation rate total cohort at $r = 0.526$, graduation rate four year at $r = 0.494$, and graduation rate six year at 0.548. All four of these correlations were statistically significant with p-values of <0.001. When all of the data were considered together, state appropriations and state appropriations per student for all states were statistically significant when correlated to the four performance outcomes.

All of the states together have a correlation between state appropriations and performance outcomes, but the states with different types of funding must be explored and compared. The states with incremental funding were explored as a whole in Table 28 while states with performance-based funding were explored as a whole in Table 27. The states with incremental funding had a correlation between state appropriations and full-time retention rate of $r = 0.655$ compared to $r = 0.703$ in states with performance-based funding. State appropriations correlated to graduation rate total cohort was $r = 0.602$ for incremental states compared to $r = 0.704$ for performance-based states. States with incremental funding correlated state appropriations with graduation rate four year at $r = 0.691$ compared to $r = 0.611$ in states with performance-based funding. The correlation between state appropriations and graduation rate six year was $r = 0.602$ in states with incremental funding compared to $r = 0.729$ in states with performance-based funding. All eight of these correlations had p-values of <0.001. States with incremental funding had lower correlation values than states with performance-based funding for full-time retention rate, graduation rate total cohort, and graduation rate six year, but had higher correlation values for graduation rate four year. Both types of states had statistically significant correlation for all

four performance outcomes when correlated with state appropriations. States with incremental funding have statistically significant correlation between state appropriations and all four performance outcomes.

The correlations for state appropriations per student with all four performance outcomes were explored to control for the different size of institutions. These correlations were explored in Table 30 for states with incremental funding and in Table 29 for states with performance-based funding. States with incremental funding had correlation value of $r = 0.291$ with a p-value of 0.005 when correlating state appropriations per student with full-time retention rate compared to $r = 0.495$ with a p-value of <0.001 in states with performance-based funding. The state appropriations per student correlated to graduation rate total cohort $r = 0.275$ with a p-value of 0.009 for states with incremental funding compared to $r = 0.570$ with a p-value of <0.001 for performance-based states. States with incremental funding correlated state appropriations per student with graduation rate four year at $r = 0.462$ with a p-value of <0.001 compared to $r = 0.490$ with a p-value of <0.001 in states with performance-based funding. State appropriations per student correlated with graduation rate six year was $r = 0.275$ with a p-value of 0.009 in states with incremental funding compared to $r = 0.602$ with a p-value of <0.001 in states with performance-based funding. Despite not being <0.001, all of the correlations for states with incremental funding were statistically significant. The states with incremental funding had lower correlation values than the states with performance-based funding, but the correlations for both were statistically significant. There is a statistically significant positive correlation between state appropriations per student with all four performance outcomes in states with incremental funding.

The paired states need to be examined to explore how these correlation compared in similar states. The first states compared were Kansas and Nebraska. Kansas utilized performance-based funding in its state funding model while Nebraska did not use performance-based funding in its state funding model. The correlations for these two states using state appropriations were presented in Table 31. For this correlation Kansas only had a sample size of 35 while Nebraska had a sample size of 25. It needs to be noted that these are small sample sizes, but the correlations will be explored bearing this in mind. State appropriations correlated to full-time retention rate at $r = 0.761$ with a p-value of <0.001 in Nebraska compared to $r = 0.825$ with a p-value of <0.001 in Kansas. Nebraska had a correlation value of $r = 0.733$ compared to 0.851 for Kansas when state appropriations is correlated with graduation rate total cohort. Both of these had a p-value of <0.001. For Nebraska state appropriations correlated with graduation rate four year at $r = 0.497$ with a p-value of 0.011 compared to $r = 0.637$ with a p-value of <0.001 in Kansas. State appropriations correlated with graduation rate six year at $r = 0.733$ in Nebraska with a p-value of <0.001 compared to $r = 0.874$ with a p-value of <0.001 in Kansas. Nebraska had lower correlation values than Kansas for all four performance outcomes, but it was statistically significant for full-time retention rate, graduation rate total cohort, and graduation rate six year. For graduation rate four year, the correlation for Nebraska was significant when using a 0.05 significance level, but would not be statistically significant for a 0.01 significance level. Three of the four correlation for Nebraska were statistically significant when correlating state appropriations with the four performance outcomes, but graduation rate four year was only significant if using a 0.05 significance level. Due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

In order to control for the different sizes of institutions, the four performance outcomes will be explored for Kansas and Nebraska using state appropriations per student. These correlations are presented in Table 32. State appropriations per student in Nebraska correlated to Full-time retention rate at $r = 0.605$ with a p-value of 0.001 compared to $r = 0.890$ in Kansas with a p-value of <0.001. State appropriations per student correlates with graduation rate total cohort at $r = 0.736$ in Nebraska compared to $r = 0.828$ in Kansas with p-values of <0.001 for both correlations. In Nebraska state appropriations per student correlates to graduation rate four year at $r = 0.764$ with a p-value of <0.001 compared to $r = 0.731$ with a p-value of <0.001 in Kansas. The correlation between state appropriations per student and graduation rate six year was $r = 0.736$ with a p-value of <0.001 in Nebraska compared to $r = 0.856$ with p-value of <0.001 in Kansas. Nebraska has a higher correlation value than Kansas for graduation rate four year, but Nebraska has lower correlation values for full-time retention rate, graduation rate total cohort, and graduation rate six year. However, all of these correlations are statistically significant for both states. Due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

The next two paired states are Ohio representing the performance-based states and Wisconsin representing the incremental states. The correlation values state appropriations with the four performance outcomes were presented in Table 33. The correlation between state appropriations and full-time retention rate of $r = 0.644$ in Wisconsin compared to $r = 0.692$ for Ohio. In Wisconsin the state appropriations correlated with graduation rate total cohort was $r = 0.585$ compared to $r = 0.689$ in Ohio. The correlation value was $r = 0.739$ when correlating state appropriations with graduation rate four year for Wisconsin compared to $r = 0.610$ in Wisconsin. State appropriations correlated with graduation rate six year at $r = 0.585$ in

Wisconsin compared to $r = 0.720$ in Ohio. All of the p-values were <0.001 for the correlation values for both states, so they were statistically significant. Wisconsin has lower correlation values than Ohio for full-time retention rate, graduation rate total cohort, and graduation rate six year, but Wisconsin was still had statistically significant correlation values. Wisconsin had a larger correlation than Ohio for state appropriations correlated with graduation rate four year, but it was still statistically significant in Ohio. Wisconsin had a statistically significant correlation between state appropriations and all four performance outcomes.

The correlations were also performed using state appropriations per student with the four performance outcomes to control for the size of institutions. These correlation values were presented in Table 34. The correlation between state appropriations per student and full-time retention rate was 0.305 in Wisconsin with a p-value of $r = 0.013$ compared to $r = 0.407$ in Ohio with a p-value of <0.001. State appropriations per student correlated with graduation rate total cohort at $r = 0.241$ with a p-value of 0.053 in Wisconsin compared to $r = 0.523$ with a p-value of <0.001 in Ohio. In Wisconsin the state appropriations per student correlated with graduation rate four year at $r = 0.477$ with a p-value of <0.001 compared to $r = 0.454$ with a p-value of <0.001 in Ohio. The state appropriations per student is correlated with graduation rate six year at $r = 0.241$ with a p-value of 0.053 in Wisconsin compared to $r = 0.550$ with a p-value of <0.001 in Ohio. In Wisconsin state appropriations per student correlated with graduation rate four year with a p-value of <0.001, but the other correlations are not as statistically significant. The correlation between state appropriations per student and full-time retention rate has a p-value of 0.013 which was statistically significant when using a significance level of 0.05, but is not significant for a significance level of 0.01. Both state appropriations per student with graduation rate total cohort and state appropriations per student with graduation rate six year

have p-values of 0.053 for Wisconsin, which are not significant for either significance levels of 0.01 or 0.05. All of Ohio's correlations were statistically significant regardless of significance level. Wisconsin has lower correlations for full-time retention rate, graduation rate total cohort, and graduation rate six year, but it has a higher correlation for graduation rate four year. Since the correlations for Wisconsin are not significant for graduation rate total cohort and graduation rate six year, Ohio has a stronger correlation for those performance outcomes. Wisconsin was statistically significant for state appropriations per student correlated with graduation rate four year and was statistically significant for full-time retention rate when using 0.05 significance level, but it was not statistically significant when correlating state appropriations per student with either graduation rate total cohort or graduation rate six year.

The correlations were examined for values in the same year. In order to fully explore the four performance outcome, it is important to look at the state appropriations and state appropriations per student that could have an influence on these outcomes and see if there is a correlation. For full-time retention the state appropriations and state appropriations per student will be compare with the retention rate for the following year. For example, state appropriations and state appropriations per student from 2008-2009 will be correlated with the full-time retention rate for 2009-2010. This will be correlated for all possible combination from 2008-2013. As discussed in question two, this correlation will be referred to as retention rate lag. Similarly, graduation rate four year will be correlated with all the years that could possibly influence it. For example, the total state appropriations and state appropriations per student for 2008-2009, 2009-2010, 2010-2011, and 2011-2012 will both be correlated with the graduation rate four year for 2011-2012. All possible comparisons from 2008-2013 of this type were correlated for the study. This will be referred to as graduation rate lag when interpreting the

correlations. The Colorado and Indiana data will still be excluded for the reason enumerated previously.

The retention rate lag correlations for all of the states as a unit were presented in Table 35 and Table 36. State appropriations correlated with the retention rate lag at $r = 0.644$ with a p-value of <0.001 for all states together. The correlation for state appropriations per student with retention rate lag was $r = 0.512$ with a p-value of <0.001. Overall the states had statistically significant correlations for both state appropriations and state appropriations per student when correlated with the retention lag.

Since the overall was statistically significant, the correlations within the two types of funding were explored to see if the correlations were significant among states with a certain types of funding. The correlations between state appropriations and the retention rate lag were presented in Table 38 for states with incremental funding and in Table 37 for states with performance-based funding. The correlation in states with incremental funding was $r = 0.660$ compared to $r = 0.711$ in state with performance-based funding. Both of these correlations were statistically significant with p-values of <0.001. States with incremental funding have a statistically significant correlation between state appropriations and retention rate lag.

The correlation between state appropriations per student and retention rate lag was explored in Table 40 for states with incremental funding and in Table 39 for states with performance-based funding. The correlation for state funding per student and retention rate lag was $r = 0.315$ with a p-value of 0.007 for states with incremental funding compared to $r = 0.521$ with a p-value of <0.001 for states with performance-based funding. The correlation in incremental states was lower, but both types had statistically significant correlations. In states

with incremental funding there is statistically significant correlation between state appropriations per student and retention rate lag.

Following the correlations broken up by types of funding, states from each type were compared with similar states to see how the correlations differed in similar states. The first states compared were Kansas and Nebraska. Kansas uses performance-based funding as a part of its funding model, while Nebraska does not utilize performance-based funding in its funding model. The correlations for these two states are presented in Table 41 and Table 42. In Nebraska state appropriations correlated with retention rate lag at $r = 0.787$ with a p-value of <0.001 compared to $r = 0.830$ with a p-value of <0.001 in Kansas. State appropriations per student correlates with retention rate lag at $r = 0.625$ in Nebraska with a p-value of 0.003 compared to $r = 0.901$ in Kansas with a p-value of <0.001. Nebraska had lower correlations for both of these correlations, but the correlations were still statistically significant. Nebraska had a statistically significant correlation for both state appropriations and state appropriations per student with retention rate lag. The sample sizes for both states were small for this correlation, so the strength of these correlations may be weakened. Due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

The next pair of states to be compared was Wisconsin and Ohio. Ohio used performance-based funding as part of its funding model, while Wisconsin did not use performance-based funding in its model. The correlations for these two states with retention lag are presented in Table 43 and Table 44. A correlation value of $r = 0.642$ was recorded for Wisconsin when correlating state appropriations with retention rate lag compared to $r = 0.702$ for Ohio with p-values of <0.001 for both correlations. In Wisconsin state appropriations per student correlates with retention rate lag at $r = 0.332$ with a p-value of 0.016 compared to $r = 0.434$ with a p-

value of <0.001 in Ohio with a p-value of <0.001. Wisconsin's correlation value was statistically significant for a significance level of 0.05, but was not statistically significant for a significance level of 0.01. Wisconsin had a lower correlation than Ohio for both correlations, but both are statistically significant with a significance level of 0.05. If compared with a significance level of 0.01, then Ohio would have a better correlation for state appropriations per student correlated with retention rate lag. For state appropriations correlated with retention rate lag both are statistically significant regardless of significance level. Wisconsin had a statistically significant for both state appropriations and state appropriations per student when correlated with retention rate lag with significance level of 0.05, but only state appropriations correlates with retention rate lag if considered with a significance level of 0.01.

Retention rate lag has been thoroughly explored with regards to type of funding and state, so the focus shifted to graduation rate lag. The correlations for both state appropriations and state appropriations per student with graduation rate lag for all states together are presented in Table 45 and Table 46. State appropriations was correlated with graduation rate lag at $r = 0.657$ and a p-value of <0.001, while state appropriations per student were correlated with graduation rate lag at $r = 0.517$ with a p-value of <0.001. When all states are considered together, the correlations for both state appropriations and state appropriations per student with graduation rate lag are statistically significant.

Overall graduation rate lag has a statistically significant correlation for both state appropriations and state appropriations per student, so the correlations were examined with regards to the two types of funding and presented in Table 47 and Table 48. State appropriations correlated with graduation rate lag at $r = 0.709$ in states with incremental funding compared to r =0.657 in states with performance-based funding. Both of these correlations were significant

with p-values of <0.001. For this correlation incremental states had higher correlations, but the performance states correlations were still significant. States with incremental funding had a statistically significant correlation between state appropriations over the four years of college and the graduation rate four year for the corresponding year.

Graduation rate lag was next correlated for the state appropriations per student for the two types of funding. These correlations were presented in Table 49 and Table 50. For states with incremental funding states appropriations per student correlated with graduation rate lag at $r = 0.457$ with a p-value of 0.005 compared to $r = 0.526$ with a p-value of <0.001 for states with performance-based funding. The correlation was slightly lower for states with incremental funding, but both correlations were statistically significant. In states with incremental funding the state appropriations per student correlated to graduation rate lag were statistically significant.

Next, the paired states were examined to compare correlations for similar states. The first paired states examined were Kansas and Nebraska. Kansas utilized performance-based funding in its funding model, while Nebraska did not use performance-based funding in its funding model. These correlation values are presented in Table 51 and Table 52. These sample spaces are small with only 10 data points for Nebraska and 14 for Kansas. This makes the correlations computed for the states less statistically significant. However, they will be calculated for completeness. State appropriations correlated with graduation rate lag at $r = 0.593$ in Nebraska with a p-value of 0.071 compared to $r = 0.868$ with a p-value of <0.001 in Kansas. Nebraska has a lower correlation value than Kansas and is not statistically significant. This could be a result of the sample size, but for the data for Nebraska was not statistically significant. Due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

State appropriations per student in Nebraska correlated with graduation rate lag at $r = 0.845$ with a p-value of 0.002 compared to $r = 0.917$ in Kansas with a p-value of <0.001. Both of these correlations are statistically significant. Due to the small sample size, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

The next pair of states to be compared are Ohio and Wisconsin. Ohio had performance-based funding in its funding model, while Wisconsin did not utilize performance-based funding in its model. Wisconsin has a small sample size of 26, which could diminish the validity of the conclusions that can be drawn from the data. The correlations for Ohio and Wisconsin are presented in Table 53 and Table 54. State appropriations correlates with graduation rate lag at $r = 0.748$ in Wisconsin compared to $r = 0.644$ in Ohio. Both of these correlation are statistically significant. In Wisconsin state appropriations per student correlated with graduation rate lag at $r = 0.47$ with a p-value of 0.015 compared to $r = 0.494$ in Ohio with a p-value of <0.001. Ohio's correlation was statistically significant regardless of significance level, but Wisconsin is only statistically significant with a significance level of 0.05. Wisconsin had a larger correlation value for state appropriations correlated to graduation rate lag, but was smaller correlation value for state appropriations per student correlated to graduation rate lag. Due to the small sample size of Wisconsin, caution must be taken when using these data results to infer meaning on a larger or different sample or group.

The specific correlation listed above were used to explore the correlation between incremental funding and both retention rate and graduation rate. A similar state with performance-based funding was used to help examine the differences in the effect of funding on the performance outcomes. In states with incremental funding all of the correlations for full-time retention rate were statistically significant, except for the correlation between state

appropriations per student and full-time retention rate in Wisconsin. It had a p-value of 0.013, which would only be significant with a significance level of 0.05. However, all of the correlations for states with performance-based funding were statistically significant regardless of significance level. Full-time retention was also explored using a retention lag correlation. This allowed for a comparison of funding that lead to retention the following year. States with incremental funding had statistically significant correlations for all of the correlation, except for the correlation between state appropriation per student and retention rate lag in Wisconsin. It had a p-value of 0.016, which is only significant for a significance level of 0.05. However, the performance states had statistically significant correlations for all of the different comparisons. States with incremental funding had lower correlation with full-time retention rate than in states with incremental funding, but with the statistical significance of almost all the correlations for both types it could not concluded that states with incremental funding were more weakly correlated with full-time retention rate.

Graduation rate total cohort, graduation rate four year, and graduation rate six year were correlated with state appropriation and state appropriation per student to explore the strength of correlations for graduation rate in incremental state. In states with incremental funding all of the correlations for graduation rate were statistically significant, except for two in Wisconsin. The graduation rate total cohort and graduation rate six year for Wisconsin did not have statistically significant correlations with state appropriation per student. Both had p-values of 0.053. However, the performance states had statistically significant correlations for all of the correlations involving the three types of graduation rates. Wisconsin, which is an incremental state, had weaker correlations for graduation rate total cohort and graduation rate six year than the performance-based funding state of Ohio. The graduation rate lag was also examined. The

graduation rate lag used all four years of funding to compare to the four year graduation rate. The graduation rate lag had statistically significant correlations in the states with incremental funding for all of the different correlations, except state appropriation per student correlated with graduation rate lag in Wisconsin. It had a p-value of 0.015, which is only significant with a significance level of 0.05. The states with performance-based funding were significant for all of the correlations computed for graduation rate lag. The correlations for Wisconsin, which used incremental funding, with student appropriations and graduation rate lag were higher than the correlations for Ohio, which used performance-based funding. States with incremental funding had a statistically significant correlation with graduation rate for many of the correlations, but Wisconsin had a few correlations that were weaker than Ohio. As a group incremental states had a statistically significant correlations that were comparable to performance states. However, Wisconsin did have correlations that were not significant. The correlations for incremental states were not weaker than the performance states, but there were some areas of concern. Further study would be beneficial in exploring these differences.

Research Question 4

4. To what extent could the amount of state funding in conjunction with either performance-based funding or incremental funding be used to influence and/or predict increases in both retention rate and graduation rate?

In order to examine this question, a variety of variables were used to create multiple regression equations for both retention rate and graduation rate. Regression equations for full-time retention rate and graduation rate four year were produced for states with both types of funding separately using the data collected from the same years. Using the retention lag and graduation rate lag would be a useful experiment, but it would also be unwieldy for the other

variables examined and would create a small sample size. For this reason the original data using information from the same year will be used to create these equations. The variables used are listed in Table 55 and descriptions are available in Appendix B. There are a plethora of variables that could be input variables for predicting full-time retention rate or four year graduation rate. This study chose to focus on the variables in Table 55, but future studies may choose to use a wider variety of variables.

Table 55

Variable Assignments

Variable	Variable Name
x_1	State Appropriations
x_2	Total Enrollment
x_3	State Appropriations per Student
x_4	Percent Admitted Total
x_5	Percentage Receiving Any Financial Aid
x_6	Percentage Receiving Federal, State, Local, or Institutional Grant Aid.
x_7	Percentage Receiving Pell Grants
x_8	Percentage Receiving Federal Loan Aid
x_9	Full-time Enrollment
x_{10}	Total Enrollment Entering Undergraduate Students
x_{11}	Full-time First-Time Degree Seeking Undergraduate Enrollment
x_{12}	SAT 25th Percentile Composite Score (Critical Reading Score Plus Math Score)
x_{13}	SAT 75th Percentile Composite Score (Critical Reading Score Plus Math Score)
x_{14}	ACT 25th Percentile Composite Score
x_{15}	ACT 75th Percentile Composite Score
y_1	Full-time Retention Rate
y_2	Graduation Rate Total Cohort
y_3	Graduation Rate Four Year
y_4	Graduation Rate Six Year

There are four output variables listed as y_1, y_2, y_3, and y_4 representing full-time retention rate, graduation rate total cohort, graduation rate four year, and graduation rate six year respectively. Equations were only created for full-time retention rate and graduation rate four year. From the correlations examined it was apparent that in some states graduation rate six year and graduation rate total cohort were reported in the same value, while in other states they were

reported as defined in Appendix B. Also graduation rate four year was statistically significant in states with both types of funding, while the other two graduation rates were not significant for some states with incremental funding. For these reasons, the multiple linear regression was limited to only graduation rate four year and full-time retention rate. The first equation produced was for states with performance-based funding and retention rate.

Table 56

Correlation Between Each Input Variable and Performance Outcomes for All States With Performance-based Funding in Study

	y_1	P-value	y_3	P-value
x_1	0.755	<0.001	0.572	<0.001
x_2	0.834	<0.001	0.662	<0.001
x_3	0.257	0.005	0.264	0.004
x_4	0.032	0.733	0.006	0.951
x_5	-0.328	<0.001	-0.213	0.021
x_6	-0.170	0.068	0.043	0.647
x_7	-0.814	<0.001	-0.674	<0.001
x_8	-0.412	<0.001	-0.249	<0.001
x_9	0.853	<0.001	0.719	<0.001
x_{10}	0.861	<0.001	0.746	<0.001
x_{11}	0.856	<0.001	0.792	<0.001
x_{12}	0.857	<0.001	0.752	<0.001
x_{13}	0.812	<0.001	0.686	<0.001
x_{14}	0.917	<0.001	0.817	<0.001
x_{15}	0.909	<0.001	0.756	<0.001

n=116

Multiple linear regression will be used to create an equation for full-time retention rate in states with performance-based funding. The regression was performed using backward stepwise elimination. In this process, an equation with all variables is created and checked for statistical significance. Then each variable is removed individually, the equation is ran without that variable, and the adjusted R^2 for each is recorded. The variable that kept the equation the strongest by maintaining a high adjusted $R^2$was chosen and then the process repeats until the best possible regression is achieved. The best equation will have a high adjusted R^2 while

simultaneously having a minimal number of variables. For this study, the regression was ran for multiple steps until the minimum number of variables could be reach without decreasing the adjusted R^2 by more than 0.01 from its highest value.

The first multiple linear regression was performed for states with performance-based funding with full-time retention. Since this is solely focus on the performance states and will not be used for comparison with incremental states, all three states will be included in the process. Before beginning the process for multiple linear regression, the correlations for each variable with the two outputs were examined and presented in Table 56. For full-time retention most of the variables had a reasonable strong correlation except for percent admitted (x_4). This variable was removed from the equation before beginning multiple linear regression. The initial equation with all of the variables except x_4 is $y_1 = -0.00000002442x_1 + 0.00004455x_2 + 0.001x_3 - 0.047x_5 + 0.039x_6 - 0.239x_7 + 0.112x_8 + 0.001x_9 - 0.001x_{10} + 0.000x_{11} + 0.039x_{12} - 0.031x_{13} + 0.503x_{14} + 1.647x_{15} + 19.200$. The statistical values for this equation are presented in Table 57. This model was statistically significant using an ANOVA test with an adjusted $R^2 = 0.905$.

Table 57

Statistical Information for Initial Equation for Full-time Retention Rate in States With Performance-based Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Retention Rate				
Initial Equation	0.916	0.905	78.857	<0.001

The backward stepwise method was used for 8 steps to find the final equation. These intermediate steps are listed in Table 58 with the variables included for each equation and the corresponding R^2 and adjusted R^2 values. The highest adjusted R^2value was 0.908 for the

intermediate equations, but a slight decrease in adjusted R^2 is acceptable to simplify the equation by having fewer variables.

Table 58

Intermediate Equations for Full-time Retention Rate in States With Performance-based Funding

Variables in Equation	R^2	Adjusted R^2
$x_1, x_3, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}, x_{15}$	0.916	0.905
$x_1, x_3, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{12}, x_{13}, x_{14}, x_{15}$	0.916	0.906
$x_1, x_3, x_6, x_7, x_8, x_9, x_{10}, x_{12}, x_{13}, x_{14}, x_{15}$	0.916	0.907
$x_1, x_3, x_7, x_8, x_9, x_{10}, x_{12}, x_{13}, x_{14}, x_{15}$	0.916	0.908
$x_1, x_3, x_7, x_8, x_9, x_{12}, x_{13}, x_{14}, x_{15}$	0.915	0.908
$x_1, x_3, x_7, x_8, x_9, x_{12}, x_{13}, x_{15}$	0.914	0.908
$x_1, x_3, x_7, x_9, x_{12}, x_{13}, x_{15}$	0.909	0.903

The least variables possible while staying within 0.01 of the largest adjusted R^2 value was 6 variables. The final regression equation for states with performance-based funding to predict full-time retention rate was $y_1 = -0.00000005673x_1 + 0.001x_3 - 0.196x_7 + 0.001x_9 + 0.005x_{12} + 1.865x_{15} + 19.044$. The statistical values for this equation are presented in Table 59. The input variables that make up the equation are state appropriations, state appropriations per student, percentage receiving Pell grants, full-time enrollment, SAT 25th percentile composite score (critical reading score plus math score), and ACT 75th percentile composite score. The coefficients values help predict the correlative relationship between each input and full-time retention rate. For every $100,000,000 in state appropriations corresponded to a decrease the full-time retention rate by 5.673 percent, and every $1,000 in state appropriations per student corresponded to a 1% increase in full-time retention. For every 10% increase in Pell grants at an institution corresponded to a 1.96% decrease in full-time retention, and for every 1000 student increase in full-time enrollment corresponded to 1% increase in full-time retention. For every 100 increase in SAT 25th percentile composite score corresponds to a 0.5% increase in full-time retention rate, and for every increase of 1 on ACT 75th percentile composite score

corresponded to a 1.865% increase in full-time retention rate. These are the values based on the equation produced from the data collected on IPEDS. The P-P plot in figure 1 was used to explore the normality of the residuals for the final equation for full-time retention rate in states with performance-based funding. Based on the plot, the residuals appeared to be approximately normal, so the equation was good for predicting the full-time retention rate.

Table 59

Statistical Information for Final Equation for Full-time Retention Rate in States With Performance-based Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Retention Rate				
Final Equation	0.904	0.899	170.753	<0.001

Many of these coefficient effects did not appear to have much influence on full-time retention rate. An increase of 1000 on SAT 25th percentile composite score for an institution would only increase full-time retention rate by 5%. Considering that the SAT composite can only have a maximum of 1600, it appears that this influence may be negligible. This equation can give an idea of relationship between these variables, but using it and expecting to increase full-time retention rate would be inadvisable. These variables have statistically significant correlations, but that does not ensure causation. Many of these input variable may correlated with each other, which could affect the validity of the equation.

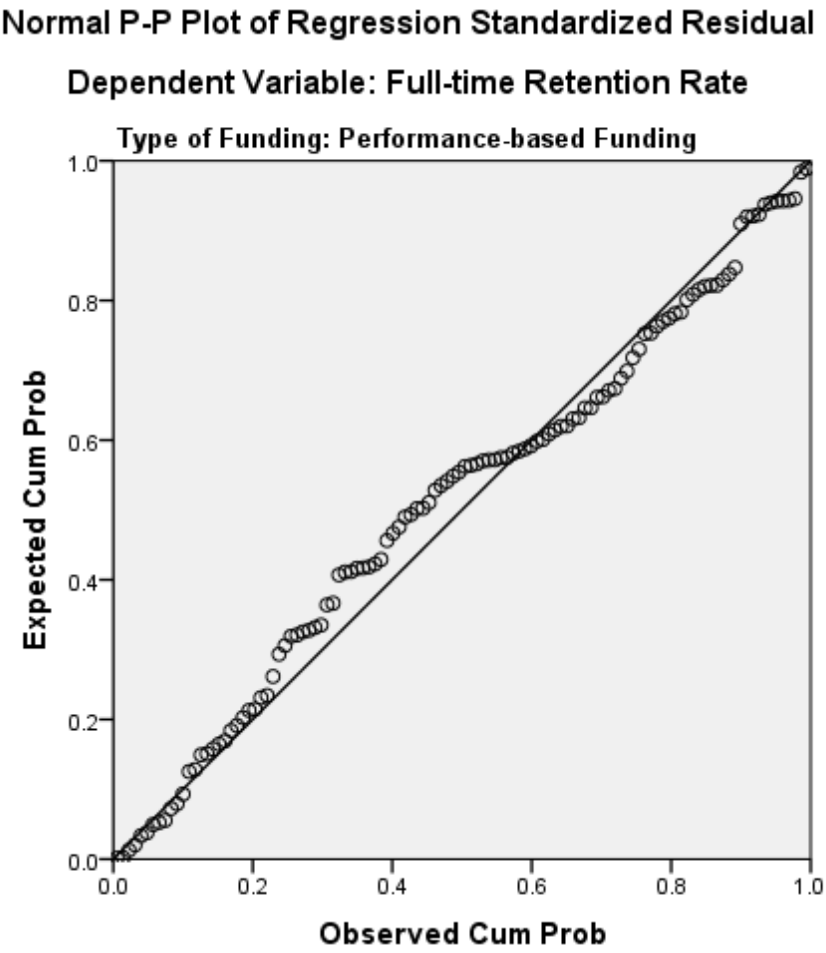

Figure 1. Normal P-P for the final equation in states with performance-based funding using multiple linear regression to predict full-time retention rate.

The equation for full-time retention in states with performance-based funding was created and graduation rate four year equation was created next next. The correlations for each variable were examined for graduation rate four year from Table 56. Two variable were poorly correlated to graduation rate four year, so x_4 and x_6 were excluded from the equation before starting the regression process. The initial regression equation for graduation rate four year was $y_3 = -0.0000001527x_1 - 0.001x_2 + 0.003x_3 + 0.094x_5 - 0.133x_7 + 0.084x_8 + 0.000x_9 + 0.003x_{10} + 0.002x_{11} + 0.077x_{12} - 0.061x_{13} + 3.360x_{14} + 0.841x_{15} - 88.264$. The statistical

information for this initial equation is presented in Table 60. This equation has an adjusted $R^2 =$ 0.873 and was statistically significant according to an ANOVA test.

Table 60

Statistical Information for Initial Equation for Graduation Rate Four Year in States With Performance-based Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Graduation Rate Four year Initial Equation	0.887	0.873	61.750	<0.001

The backward stepwise method was used for 6 steps to find the final equation. These intermediate steps are listed in Table 61 with the variables included for each equation and the corresponding R^2 and adjusted R^2 values. The highest adjusted R^2value was 0.875 for the intermediate equations, but a slight decrease in adjusted R^2 is acceptable to simplify the equation by having fewer variables.

Table 61

Intermediate Equations for Graduation Rate Four Year in States With Performance-based Funding

Variables in Equation	R^2	Adjusted R^2
$x_1, x_2, x_3, x_5, x_7, x_8, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}, x_{15}$	0.887	0.874
$x_1, x_2, x_3, x_7, x_8, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}, x_{15}$	0.887	0.875
$x_1, x_2, x_3, x_7, x_8, x_{10}, x_{12}, x_{13}, x_{14}, x_{15}$	0.886	0.875
$x_1, x_2, x_3, x_7, x_8, x_{10}, x_{12}, x_{13}, x_{14}$	0.884	0.874
$x_1, x_2, x_3, x_7, x_{10}, x_{12}, x_{13}, x_{14}$	0.881	0.873

The least variables possible while staying within 0.01 of the largest adjusted R^2 value was 7 variables. The final regression equation for states with performance-based funding to predict full-time retention rate was $y_3 = -0.0000001927x_1 - 0.001x_2 + 0.004x_3 + 0.003x_{10} + 0.078x_{12} - 0.059x_{13} + 3.954x_{14} - 77.760$. The statistical values for this equation are presented in Table 62. The input variables that make up the equation are state appropriations,

total enrollment, state appropriations per student, full-time enrollment, SAT 25th percentile composite score (critical reading score plus math score), SAT 75th percentile composite score (critical reading score plus math score), and ACT 25th percentile composite score. The coefficients values help predict the correlative relationship between each input and graduation rate four year. For every $10,000,000 in state appropriations corresponded to a decrease in the graduation rate four year by 1.927 percent, and for every 1000 student increase in total enrollment corresponded to a decrease of 1 percent in graduation rate four year. For every $1,000 in state appropriations per student corresponded to a 4% increase in four year graduation rate, and for every 1000 student increase in full-time undergraduate enrollment at an institution corresponded to a 3% increase in graduation rate four year. For every 100 increase in SAT 25th percentile composite score corresponds to a 7.8% increase in four year graduation rate, and for every increase in SAT 75th percentile composite score corresponded to a 5.9% decrease in graduation rate four year. For every increase of 1 on ACT 25th percentile composite score for an institution corresponded to a 3.954% increase in graduation rate four year. These are the values based on the equation produced from the data collected on IPEDS for Indiana, Kansas, and Ohio. The P-P plot in figure 2 was used to explore the normality of the residuals for the final equation for graduation rate four year in states with performance-based funding. Based on the plot, the residuals appeared to be approximately normal, so the equation was good for predicting the graduation rate four year.

Table 62

Statistical Information for Final Equation for Graduation Rate Four Year in States With Performance-based Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Graduation Rate Four Year Final Equation	0.879	0.871	111.671	<0.001

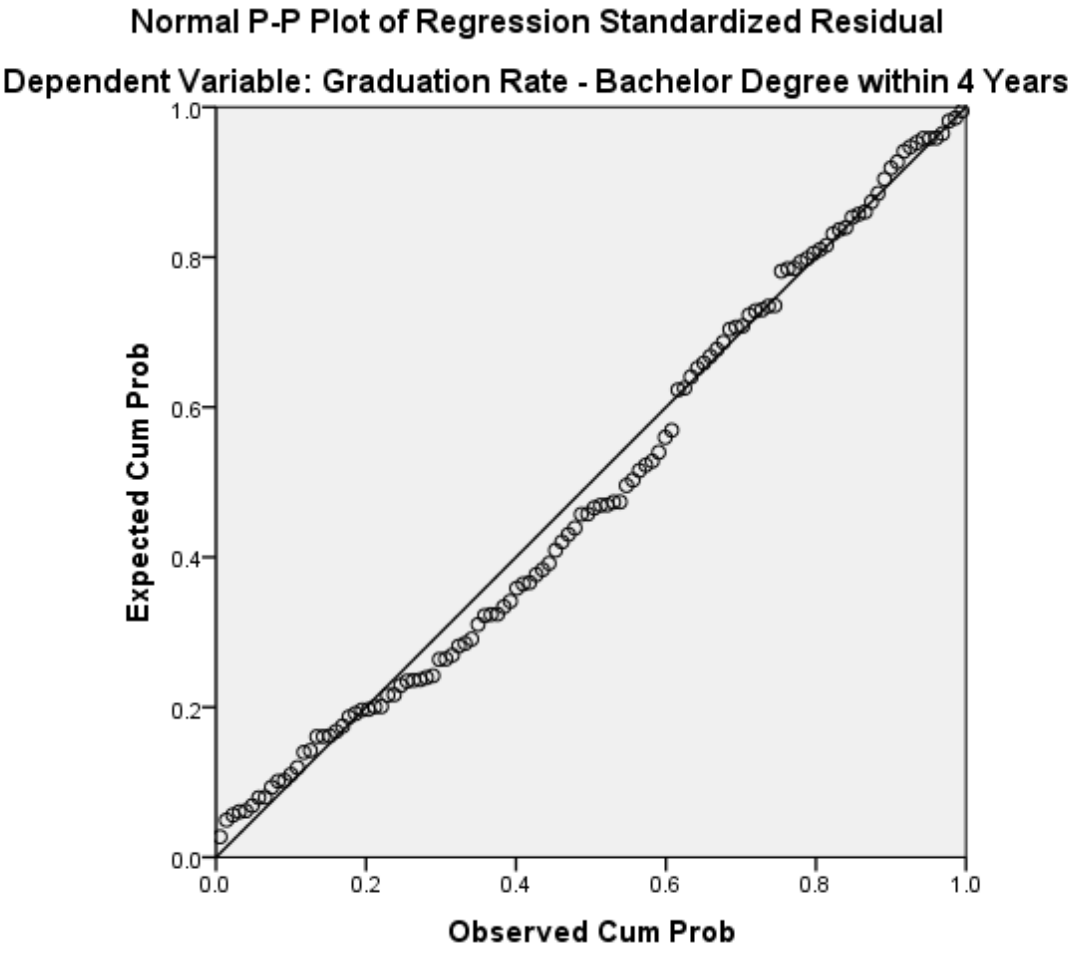

Figure 2. Normal P-P for the final equation in states with performance-based funding using multiple linear regression to predict graduation rate four year.

Many of these coefficient effects did not appear to have much influence on full-time retention rate. This equation can give an idea of relationship between these variables, but using it to change or accurately predict graduation rate four year would be inadvisable. These variables

have statistically significant correlations, but that does not ensure causation. Many of these variable may not have a strictly one way relationship. Some of these input variables may be correlated, which could affect the validity of the equation.

Table 63

Correlation Between Each Input Variable and Performance Outcomes for States With Incremental Funding

	y_1	P-value	y_3	P-value
x_1	0.934	<0.001	0.885	<0.001
x_2	0.947	<0.001	0.945	<0.001
x_3	0.737	<0.001	0.579	0.008
x_4	-0.708	<0.001	-0.578	0.008
x_5	-0.721	<0.001	-0.807	<0.001
x_6	-0.202	0.392	-0.357	0.123
x_7	-0.785	<0.001	-0.773	<0.001
x_8	-0.766	<0.001	-0.798	<0.001
x_9	0.946	<0.001	0.951	<0.001
x_{10}	0.921	<0.001	0.926	<0.001
x_{11}	0.914	<0.001	0.914	<0.001
x_{12}	0.873	<0.001	0.876	<0.001
x_{13}	0.851	<0.001	0.731	<0.001
x_{14}	0.972	<0.001	0.962	<0.001
x_{15}	0.903	<0.001	0.817	<0.001

n=20

With the equations for the states with performance-based funding created it is time to focus on states with incremental funding. For incremental states Colorado needs to be excluded, so the equations were created using only Nebraska and Wisconsin data. Before running the regression, the correlations for each variable were calculated and presented in Table 63. When running regression all variables must have a value for each set of corresponding data points, so where any value was missing that entire set of data is removed. The SAT scores were not reported for all of the institutions, so this left a sample of size 20. This was too small for a statistically significant regression to be computed, so variables x_{12} and x_{13} were removed and the correlations were computed again in Table 64.

Table 64

Correlation Between Each Input Variable and Performance Outcomes for States With Incremental Funding

	y_1	P-value	y_3	P-value
x_1	0.652	<0.001	0.713	<0.001
x_2	0.579	<0.001	0.592	<0.001
x_3	0.391	<0.001	0.467	<0.001
x_4	-0.712	<0.001	-0.607	<0.001
x_5	-0.421	<0.001	-0.408	<0.001
x_6	-0.036	0.752	-0.030	0.792
x_7	-0.740	<0.001	-0.712	<0.001
x_8	-0.550	<0.001	-0.544	<0.001
x_9	0.638	<0.001	0.668	<0.001
x_{10}	0.625	<0.001	0.624	<0.001
x_{11}	0.686	<0.001	0.694	<0.001
x_{14}	0.906	<0.001	0.916	<0.001
x_{15}	0.857	<0.001	0.828	<0.001

n=80

The first multiple linear regression for the states with incremental funding will be for full-time retention rate. The two variables dealing with SAT percentiles have been removed to increase the sample size and variable x_6 will also be removed because it is not strongly correlated with retention rate. Multiple linear regression was used with the remaining variables to find an initial equation. The initial regression equation for full-time retention rate in incremental states was $y_1 = -0.00000003487x_1 - 0.001x_2 + 0.000x_3 - 0.234x_4 + 0.194x_5 - 0.274x_7 + 0.121x_8 + 0.002x_9 - 0.001x_{10} + 0.001x_{11} + 1.132x_{14} + 1.484x_{15} + 21.198$. The statistical values for this equation are presented in Table 65. This model was statistically significant using an ANOVA test with an adjusted $R^2 = 0.883$.

Table 65

Statistical Information for Initial Equation for Full-time Retention Rate in States With Incremental Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Retention Rate				
Initial Equation	0.901	0.883	51.430	<0.001

The backward stepwise method was used for 5 steps to find the final equation. These intermediate steps are listed in Table 66 with the variables included for each equation and the corresponding R^2 and adjusted R^2 values. The highest adjusted R^2value was 0.884 for the intermediate equations, but a slight decrease in adjusted R^2 is acceptable to simplify the equation by having fewer variables.

Table 66

Intermediate Equations for Full-time Retention Rate in States With Incremental Funding

Variables in Equation	R^2	Adjusted R^2
$x_1, x_2, x_4, x_5, x_7, x_8, x_9, x_{10}, x_{11}, x_{14}, x_{15}$	0.900	0.884
$x_1, x_4, x_5, x_7, x_8, x_9, x_{10}, x_{11}, x_{14}, x_{15}$	0.897	0.882
$x_1, x_4, x_5, x_7, x_8, x_9, x_{10}, x_{14}, x_{15}$	0.892	0.879
$x_1, x_4, x_5, x_7, x_8, x_9, x_{14}, x_{15}$	0.890	0.878

The least variables possible while staying within 0.01 of the largest adjusted R^2 value was 7 variables. The final regression equation for states with incremental funding to predict full-time retention rate was $y_1 = -0.00000001797x_1 - 0.149x_4 - 0.176x_7 + 0.187x_8 + 0.000x_9 + 1.946x_{14} + 1.689x_{15} - 0.527$. The statistical values for this equation are presented in Table 67. The input variables that make up the equation are state appropriations, percent admitted, percentage receiving Pell grants, percentage receiving federal student loans, full-time enrollment, ACT 25th percentile composite score, and ACT 75th percentile composite score. The coefficients values help predict the correlative relationship between each input and full-time

retention rate. For every $100,000,000 in state appropriations corresponded to a decrease the full-time retention rate by 1.797 percent, and for every 10% increase in the percent admitted corresponded to a 1.49% decrease in full-time retention rate. For every 10% increase in Pell grants at an institution corresponded to a 1.76% decrease in full-time retention, and for every 10% increase in full-time first-time undergraduates receiving federal student loans corresponded to a 1.87% increase in retention rate. For every increase of 1 on ACT 25th percentile composite score at an institution corresponded to a 1.946% increase in full-time retention rate, and for every increase of 1 on ACT 75th percentile composite score corresponded to a 1.689% increase in full-time retention rate. The effect of full-time enrollment was so small that the SPSS listed the coefficient as <0.001, so it had a minimal effect on the retention rate. These are the values based on the equation produced from the data collected on IPEDS.

Many of these coefficient effects did not appear to have much influence on full-time retention rate. This equation illustrates the relationship between these variables, but it would be inadvisable to use it as a reference for methods to increase full-time retention rate without further research. These variables have statistically significant correlations, but that does not ensure causation. Many of these variable may not have a strictly one way relationship. Some of the input variables may be correlated, which could affect the validity of the equation.

Table 67

Statistical Information for Final Equation for Full-time Retention Rate in States With Incremental Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Retention Rate				
Final Equation	0.886	0.875	80.819	<0.001

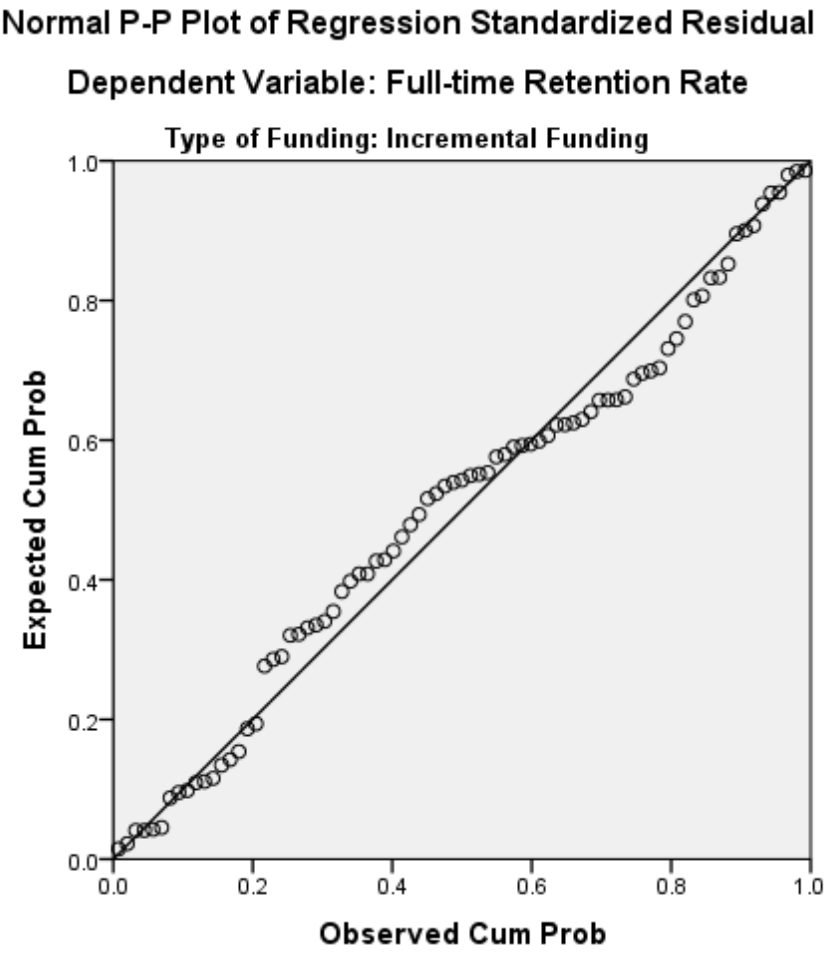

Figure 3. Normal P-P for the final equation in states with incremental funding using multiple linear regression to predict full-time retention rate.

The final regression equation created was focused on graduation rate four year in states with incremental funding. Based on the correlations in Table 64, variable x_6 were excluded along with the variables for SAT scores. The initial equation for graduation rate four year in states with incremental funding was $y_3 = -0.00000006934x_1 - 0.002x_2 + 0.000x_3 - 0.162x_4 + 0.331x_6 - 0.391x_7 + 0.095x_8 + 0.006x_9 - 0.005x_{10} + 0.005x_{11} + 1.308x_{14} + 0.872x_{15} - 32.572$. The statistical information for this initial equation is presented in Table 68. This equation has an adjusted $R^2 = 0.873$ and was statistically significant according to an ANOVA test. The P-P plot in figure 3 was used to explore the normality of the residuals for the

final equation for full-time retention rate in states with incremental funding. Based on the plot, the residuals appeared to be approximately normal, so the equation was good for predicting the full-time retention rate.

Table 68

Statistical Information for Initial Equation for Graduation Rate Four Year in States With Incremental Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Graduation Rate Four year Initial Equation	0.935	0.924	80.957	<0.001

The backward stepwise method was used for 5 steps to find the final equation. These intermediate steps are listed in Table 69 with the variables included for each equation and the corresponding R^2 and adjusted R^2 values. The highest adjusted R^2value was 0.875 for the intermediate equations, but a slight decrease in adjusted R^2 is acceptable to simplify the equation by having fewer variables.

Table 69

Intermediate Equations for Graduation Rate Four Year in States With Incremental Funding

Variables in Equation	R^2	Adjusted R^2
$x_1, x_2, x_4, x_5, x_7, x_8, x_9, x_{10}, x_{11}, x_{14}, x_{15}$	0.935	0.925
$x_1, x_2, x_4, x_5, x_7, x_9, x_{10}, x_{11}, x_{14}, x_{15}$	0.933	0.924
$x_1, x_2, x_4, x_5, x_7, x_9, x_{10}, x_{11}, x_{14}$	0.932	0.923
$x_1, x_2, x_5, x_7, x_9, x_{10}, x_{11}, x_{14}$	0.928	0.920

The least variables possible while staying within 0.01 of the largest adjusted R^2 value was 7 variables. The final regression equation for states with incremental funding to predict full-time retention rate was $y_3 = -0.00000003024x_1 - 0.002x_2 + 0.351x_5 - 0.392x_7 + 0.005x_9 - 0.002x_{10} + 2.414x_{14} - 43.519$. The statistical values for this equation were presented in Table 70. The input variables that make up the equation are state appropriations,

total enrollment, percentage receiving any financial aid, percentage receiving Pell grants, full-time enrollment, Full-time undergraduate enrollment, and ACT 25th percentile composite score. The coefficients values help predict the correlative relationship between each input and graduation rate four year. For every $100,000,000 in state appropriations corresponded to an decrease the four year graduation rate by 3.024 percent, and for every increase of 1000 students in total enrollment corresponded to a 2% decrease in graduation rate four year. For every 10% increase in student receiving any financial aid at an institution corresponded to a 3.51% increase in four year graduation rate, and for every 10% increase in Pell grants awarded at an institution corresponded to a 3.92% decrease in graduation rate four year. For every increase of 1000 student in full-time enrollment corresponded to a 5% increase in graduation rate four year, and for every increase of 1000 in full-time undergraduate enrollment corresponded to a decrease of 2% in four year graduation rate. For every increase of 1 on ACT 25th percentile composite score at an institution corresponded to a 2.414% increase in graduation rate four year. These are the values based on the equation produced from the data collected on IPEDS. The P-P plot in figure 4 was used to explore the normality of the residuals for the final equation for graduation rate four year in states with incremental funding. Based on the plot, the residuals appeared to be approximately normal, so the equation was good for predicting the graduation rate four year.

Table 70

Statistical Information for Final Equation for Graduation Rate Four Year in States with Incremental Funding

	R^2	Adjusted R^2	ANOVA (F)	ANOVA (P-value)
Graduation Rate Four Year Final Equation	0.922	0.915	121.989	<0.001

Many of these coefficient effects did not appear to have much influence on full-time retention rate. This equation illustrates the relationship between these variables, but it would be inadvisable to use it as a guide to increasing graduation rate four year without further research. These variables have statistically significant correlations, but that does not ensure causation. Many of these variable may not have a strictly one way relationship. Some of these input variables may be correlated, which could affect the validity of the equation. The three different enrollments would have an interrelationship that could affect the accuracy of the model.

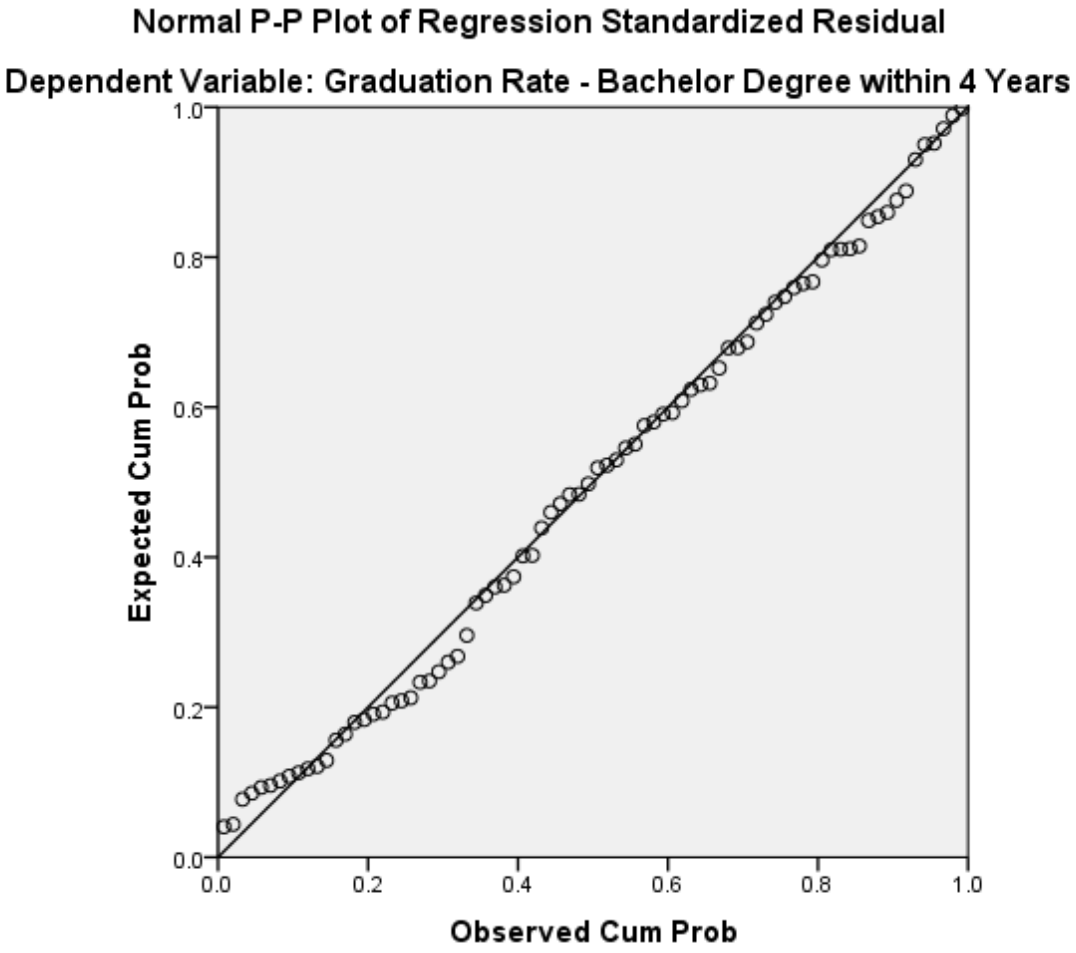

Figure 4. Normal P-P for the final equation in states with incremental funding using multiple linear regression to predict graduation rate four year.

The four equations explored above were created to find an equation to help influence and/or predict increases in both retention rate and graduation rate. The four equations were all statistically significant and the pp plots of the residuals for the equations showed that the residuals were normally distributed. This shows that the equations would be fairly accurate in predicting the retention rate and graduation rate four year in states with both types of funding. All four equations included state appropriations and full-time enrollment as input variables. Percent of first time students receiving Pell grants, ACT 25^{th} percentile composite, and ACT 75^{th} percentile composite were all used in three separate equations. SAT 25^{th} percentile was used in both equations for performance states, but was excluded from incremental states for the problems the SAT variables created in sample size. From their nature, some of these variables may have some level of correlation. For example, there were four separate enrollment variables that were interrelated. These variables were all strongly correlated to both variables, but correlation does not denote causation. The four equations are useful to explore input factors that are correlated to retention rate and graduation rate four year. These equations can be used to predict full-time retention rate and graduation rate four year. Without further study into the relationship between variables, any variable influence on the retention rate and graduation rate cannot be asserted.

Chapter Summary

Regardless of the type of funding used in a state, there was a statistically strong correlation between state appropriation and all four performance outcomes. When controlling for the differences in size of institutions by using state appropriation per student, the state of Wisconsin had weakened correlations for some of the variables. Due to differences in the way state appropriations was reported in Colorado, it had to be removed from exploration in the study. Indiana also was excluded from the comparisons to keep the same number of states in

each type of funding. Overall, states with both types of funding had strong correlations, but the states with performance-based funding did have higher correlations in general. Since most of the correlations were statistically significant for both types of funding, it could not be concluded that performance-based funding correlated more strongly with retention rate and graduation rate overall.

State appropriation was used in all four of the predicting equations created. All four of these equations were useful to predict full-time retention rate and graduation rate four year. All of these equations were statistically significant, but more research is needed to use these equations to ascertain input variables that will influence the performance outcomes.

V. Conclusion

Over the past five years, there has been a resurgence of performance-based funding models implemented throughout the United States (Tandberg & Hillman, 2014). Many previous performance-based funding models failed for perceived lack of commitment to the model and minimal financial incentive (Layzell, 1998). However, several different studies have shown little to no statistical significance of the effect of performance-based funding on performance outcomes (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). The lack of results led to the cessation of many of the performance-based models. In recent years, a new push for performance accountability has the led to the creation of a new performance-based funding model (Tandberg & Hillman, 2014). The new version of performance-based funding, known as performance funding 2.0, has used improved methods to help ensure that many of the drawbacks of the old models were addressed (Tandberg & Hillman, 2014). Many of these changes were based on conjecture, and a few studies examined the correlations between funding and performance outcomes, such as retention rates and graduation rates.

With the continued prevalence of accountability in the current political and social environment, performance-based funding remains an enticing option to ensure continued positive performance outcome results (Tandberg & Hillman, 2014). Despite the perceived influence of these models, many studies have shown a lack of significant impact on performance outcomes for the performance-based funding models (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). Examining the state funding in these states could help evaluate the impact of performance-based funding models (Sanford & Hunter, 2011).

Before showing impact or influence, it is necessary to show that a correlation exists between the variables in question. This study sought to explore the correlation between state

appropriations and performance outcomes in states with performance-based funding and states with incremental funding. A comparison of the two types of funding allowed for a discussion of the differing impacts within each type. Performance-based funding is built on the supposition that state funding can influence performance outcomes, so statistically significant correlations within these states is the first step to showing that there is an influence present. In order to control for the impact accrediting bodies can have on performance outcomes, states were chosen from within the same accrediting region and the North Central Association of Colleges and Schools was used for the study. The study was also focused on four-year colleges, so the diversity of missions between different types of institutions can be controlled to some degree. Since colleges range in size, the amount of funding given to a particular institution can be misleading. In order to control for the size of the institution, the correlations were also examined for correlation based on state appropriations per student. In order to evaluate possible input variables and create a method for predicting performance outcomes, regression equations were computed using state appropriations, state appropriations per student, and 13 other possible input variables. These different results were used to explore the impact of state funding with performance-based funding states and incremental funding states.

Summary of the Study

The purpose for conducting the study was to explore performance-based funding and examine the relationship between types of funding and performance indicators in the North Central Association of Colleges and Schools (NCA). The NCA was used for several reasons, including size and consistent level of funding. The use of colleges from the same accreditation region also nullifies the influence of different accreditation standards. The purpose was explored through the following research questions.

1. What were the state funding trends during the past five years for public four-year higher education institutions in North Central Association of Colleges and Schools (NCA)?
2. To what extent was there a correlation between performance-based funding and both retention rate and graduation rate at public four-year institutions in North Central Association of Colleges and Schools (NCA)?
3. To what extent was there a correlation between incremental funding and both retention rate and graduation rate at public four-year institutions in North Central Association of Colleges and Schools (NCA)?
4. To what extent could the amount of state funding in conjunction with either performance-based funding or incremental funding be used to influence and/or predict increases in both retention rate and graduation rate?

After a thorough exploration of funding trends, correlations, and regression models, the questions were explored and answered using data from the Integrated Post-secondary Education Data System (IPEDS). To explore trends data were also collected from the Almanac of Higher Education, which was available on the Chronicle of Higher Education website. States within the NCA, regardless of type of funding utilized, showed a decrease in funding during the first four years of the study, but had an increase during the final year of the study. States with performance-based funding showed statistically significant correlations with performance outcomes, but were, in general, not stronger than the correlations in states with incremental funding. States with incremental funding were significant for most of the performance outcomes, but did have a few less significant correlations when controlled for size of the institution. The regression equations were statistically significant and could be used to predict performance outcomes, but they did not constitute enough proof to infer influence.

Conclusions

1. The study showed that increases in state funding correlated with increased full-time retention rate regardless of funding type or state. For all states, with Colorado and Indiana removed, together the correlation was $r = 0.640$ with a p-value of <0.001 and a sample size of 284. The states with performance-based funding had a correlation of $r = 0.702$ with a p-value of <0.001 and a sample size of 194. The states with incremental funding had a correlation of $r = 0.655$ with a p-value of <0.001 and a sample size of 90. Kansas had a correlation of $r = 0.825$ with a p-value of <0.001 and a sample size of 35. Nebraska had a correlation of $r = 0.761$ with a p-value of <0.001 and a sample size of 25. Ohio had a correlation of $r = 0.692$ with a p-value of <0.001 and a sample size of 169.Wisconsin had a correlation of $r = 0.644$ with a p-value of <0.001 and a sample size of 65. All of these correlations were significant when a significance level of 0.01 was used, which shows that increases in state funding correlated with increases in full-time retention rate for all instances studied.

2. The study showed that increases in state funding correlated with increases in graduation rates for the total cohort regardless of funding type or state. For all states, with Colorado and Indiana removed, together the correlation was $r = 0.630$ with a p-value of <0.001 and a sample size of 284. The states with performance-based funding had a correlation of $r = 0.704$ with a p-value of <0.001 and a sample size of 194. The states with incremental funding had a correlation of $r = 0.602$ with a p-value of <0.001 and a sample size of 90. Kansas had a correlation of $r = 0.851$ with a p-value of <0.001 and a sample size of 35. Nebraska had a correlation of $r = 0.733$ with a p-value of <0.001 and a sample size of 25. Ohio had a correlation of $r = 0.689$ with a p-value of <0.001 and a sample size of 159.Wisconsin had a correlation of $r = 0.585$ with a p-value of <0.001 and a sample size of 65. All of these correlations were significant when a significance

level of 0.01 was used, which showed that increases in state funding correlated with increases in graduation rate graduation rate total cohort for all instances studied.

3. The study showed that increases in state funding correlated with increases in four-year graduation rate, regardless of funding type or state. For all states with Colorado and Indiana removed, together the correlation was $r = 0.616$ with a p-value of <0.001 and a sample size of 284. The states with performance-based funding had a correlation of $r = 0.611$ with a p-value of <0.001 and a sample size of 194. The states with incremental funding had a correlation of $r = 0.691$ with a p-value of <0.001 and a sample size of 90. Kansas had a correlation of $r = 0.637$ with a p-value of <0.001 and a sample size of 35. Nebraska had a correlation of $r = 0.497$ with a p-value of 0.011 and a sample size of 25. Ohio had a correlation of $r = 0.610$ with a p-value of <0.001 and a sample size of 159.Wisconsin had a correlation of $r = 0.739$ with a p-value of <0.001 and a sample size of 65. All of these correlations were significant when a significance level of 0.01 was used, which showed that increases in state funding correlated with increases in graduation rate four year for all instances studied.

4. The study showed that increases in state appropriations correlated with six-year graduation rate regardless of funding type or state. For all states, with Colorado and Indiana removed, together the correlation was $r = 0.639$ with a p-value of <0.001 and a sample size of 284. The states with performance-based funding had a correlation of $r = 0.729$ with a p-value of <0.001 and a sample size of 194. The states with incremental funding had a correlation of $r = 0.602$ with a p-value of <0.001 and a sample size of 90. Kansas had a correlation of $r = 0.874$ with a p-value of <0.001 and a sample size of 35. Nebraska had a correlation of $r = 0.733$ with a p-value of 0.011 and a sample size of 25. Ohio had a correlation of $r = 0.720$ with a p-value of <0.001 and a sample size of 159.Wisconsin had a correlation of $r = 0.585$ with a p-value of <0.001 and

a sample size of 65. All of these correlations were significant when a significance level of 0.01 was used, which showed that increases in state funding correlated with increases in graduation rate six year for all instances studied.

5. Increases in state funding and increases in state funding per student both correlated with increases in all four performance outcomes in states that used performance-based funding. States with performance-based funding had statistically significant correlations for all of the correlations for both state appropriations and state appropriations per student with the four performance outcomes.

Recommendations for Further Research

There were several possibilities for future research that came to light during the study. The most obvious study would replicate this experiment in a different accrediting region with different states. The study could also be repeated with a larger set of states from across the United States, and the same study could be completed for community colleges to evaluate the correlations and regression equations for full-time retention rate.

Another study could use the actual performance-based funding amount to calculate the correlations for performance outcomes. This would help to create a stronger sense of the direct correlation between performance funding and performance outcomes. Once a source for this information is available, a broader study and longer study of this correlation would be beneficial. With this information the study could examine the amount of performance funding and determine the level of funding necessary to see increases in performance outcomes.

The study could also be expanded to include more performance indicators or it could focus on different performance indicators. Different states used different performance indicators, so a study that focused on the performance indicators valued by the states being studied could be

an informative study. A future study could do a policy analysis in the different states and the implications for the different funding types.

Performance-based funding relies on the influence of funding with performance outcomes, so an expansion of the retention rate lag and graduation rate lag would be valuable. These correlations could be explored for more states and over an extended period of time. This would create larger sample sizes and help to create a more statistically relevant study. Retention rate lag correlation and graduation rate lag correlation can be extended to begin the process of examining causation between funding and performance outcomes.

Recommendations for Practice

The study results should be shared with state policymakers, federal policymakers, and institutional policymakers. This study is valuable for policymakers for several different reasons. For policymakers this study shows that a correlation between state appropriation and the four performance outcomes in states with performance-based funding. This provides some credence to the use of performance-based funding. However, state and institution policymakers must be wary of implying causation for the variables examined. The states with incremental funding also showed statistically significant correlations in most cases, so it could not be stated that performance-based funding was more strongly correlated than incremental funding. Policymakers should seek out further research in this area to help hone a beneficial iteration of performance-based funding.

For policymakers the results showed the impact of funding on an institutions performance outcomes. Increases in state funding correlated with increases in full-time retention rate, graduation rate total cohort, four year graduation rate, and six year graduation rate. The regression equations showed that other variables have a significant influence on these four

performance outcomes as well. The percent of Pell grant recipients had a negative impact on the full-time retention rate regardless of the state funding model used. The ACT and SAT percentile scores for the institutions also impacted the performance outcomes. It is important that policy makers understand the many factors that could influence the performance outcomes.

From a practical standpoint, there are a few things that states can do with this information to improve higher education. States need to utilize both incremental and performance funding. In order to facilitate improvement, the performance funding needs to be a substantial amount and it needs to be given consistently. States also need to reach an agreement with all institutions regarding the method used to evaluate the distribution of performance funding. This will allow institutions to facilitate performance improvements, while maintaining quality.

For institutional policymakers the results show that state funding is correlated with the success of students, but the regression equations show that there are other variables that correlate with outcomes as well. Administrators must weigh all of the different factors involved in performance outcomes and develop institutional policies that can foster the growth of these outcomes without decreasing institutional quality. Increasing performance outcomes is a complex issue and care must be taken to ensure that it is accomplished without affecting the quality of the degree earned.

Further limitations

During the course of the study, it became apparent that some variables reported to IPEDS were reported differently for each state. In Colorado it was evident that state appropriations were reported differently than other states. For this reason, Colorado was excluded from much of the study. Its pair state of Indiana was also removed from the correlations to keep an even

comparison of states. Indiana was used to compute the regression equation for question four, since these equations were focused on the best equation for the types of funding. From the data it was also apparent that Nebraska and Wisconsin reported graduation rate total cohort and graduation rate six year as the same value, while Kansas and Ohio reported them as described in Appendix B. This discrepancy led to the creation of only one regression for graduation rate four year, instead of all three graduation rates.

Kansas had performance-based funding, but it was only tied to new state funds (SRI International, 2012). During the period of the study, Kansas decreased its funding to institutions, so there may have been little to no money given for reaching performance goals. For this reason, the correlations for Kansas cannot be construed to show an influence for the actual funding given for performance-based funding. Any difference in correlation between Kansas and Nebraska may be due to the presence of a performance-based model, but the possibility of little to no funding makes this unlikely.

Discussion

Performance-based funding continues to be a recurring theme for state funding in the future, so it must be explored to provide a thorough understanding can help policymakers that create these types of funding (Tandberg & Hillman, 2014). This study showed that state funding in states with performance-based funding correlated with performance outcomes, but it also showed similar correlations in states with incremental funding. Some previous studies also found little statistical difference between performance-based funding and incremental funding (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). The correlations showed that more research into the relationship between funding and outcomes needs to be explored. Performance-based funding can have a value, but the way the funding models were

implemented and structured could have a lasting effect on the results (Sanford & Hunter, 2011). While state funding has an impact on performance outcomes, it was not the only variable used in the multiple regression that showed a strong correlation.

The relationship between state funding and performance outcomes needs to be explored more. While in a few instances performance states had stronger correlations than the paired incremental state, there was not enough evidence to say the correlations were stronger in states with performance funding overall. Research with more states and with more complete data would help to further explore this relationship. Performance-based funding linked money to institutions that improve performance outcome. Performance-based funding gave money to schools that were succeeding, but denied that funding to colleges that decrease. State funding was correlated with performance outcomes, which showed a relationship between these variables. If there increases in funding correlated with increasing in performance outcomes, then denying money to institutions that have poor performance outcomes could facilitate a continued negative effect. Correlation does not show causation, so this may not directly cause this effect. State funding and performance outcomes may not have a causal relationship. If there was a causal relationship, then it would be difficult to determine which variable was influencing the other. This would mean there is not a clear cut input variable and output variable. In order to clarify the relationship between these variables, the relationship between state funding and performance outcomes must be thoroughly examined.

In order for the performance-based funding to be successful, the models developed must take many different factors into account. The regression equations developed showed that regardless of the funding type used there were several factors other than state funding that correlate well with performance outcomes. For this reason, policymakers must be

wary when developing these funding models. Dougherty, Natow, and Vega (2012) also asserted that other indicators need to be explored and used to create funding models. Performance-based funding be supported financially and longitudinally for it to have an effect. Some of the states studied by Tandberg and Hillman (2014) showed positive effects when the performance funding was implemented for an extended period. Performance funding was often minimal, but if states provide larger funding amounts and maintain the models for longer, then they could have a greater impact on performance outcomes (Huisman & Currie, 2004). Further study of the new performance funding 2.0 models could help to examine the effectiveness of more funding and prolonged model use. More research also needs to be done into the exact amount of funding necessary to influence performance outcomes, but it must have larger enough incentives to influence change. Regardless of funding model used, state funding correlated with performance outcomes, so states must be cognizant of the impact that funding could have on the outcomes for institutions.

Chapter Summary

This study explored performance-based funding within the NCA to examine correlation between state funding and four performance outcomes. The performance outcomes were full-time retention rate, graduation rate total cohort, graduation rate four year, and graduation rate six year. State funding was correlated with performance outcomes for both performance-based funding and incremental funding. When state funding was controlled for the size of an institution, the correlations were still significant, but the correlations were lower. The regression equations showed that several other input variables were correlated with full-time retention and graduation rate four year. This study adds to the collection of performance-based funding studies that policymakers could use to decide if performance-based funding is a viable

option. Several different possible areas of future research implications for different policymakers were articulated.

This chapter explored the results calculated in chapter four and discussed the implications of those results. Six conclusions were discussed that show correlations between state funding and the four performance outcomes for states with both types of funding. States with performance-based funding also exhibited a correlation between state appropriation per student and all four performance outcomes. However, states with incremental funding also showed statistically significant correlations for most of the correlations examined, so performance-based funding's correlations could not be considered necessarily stronger. Four multiple linear regressions were created to help predict full-time retention rate and graduation rate four year in both performance state and incremental states. All four equations used state funding, but several other factors had strong correlations with full-time retention rate and graduation rate four year. Following the conclusions, the recommendations for future research were explored including the use of different states and/or a longer study of the correlations. The recommendation for practice were discussed and described how policymakers could use the results of this study to guide future decisions regarding performance-based funding. The impacts of this study were explored and discussed. Performance-based funding is popular funding mechanism with little research to show its value (Polatajko, 2011; Sanford & Hunter, 2011; Shin, 2010; Shin & Milton, 2004). If performance-based funding is used, then it must be developed in a thorough manner than utilizes the available research and is adaptive the needs of different institutions.

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Appendix A

Table 71

States with Performance-Based funding - 2012

States	Used at Two-year Institutions	Used at Four-year Institutions	Performance Indicators
Arizona	yes	yes	Degree completion, student credit hours completed, research funding, public service
Florida	yes	no	Degree completion, degree completion and job placement of at risk students
Hawai'i	yes	no	Degree completion, student credit hours completed, degree completion for native Hawaiians, STEM degrees, number of at risk students, transfers to Four-year institutions
Illinois	yes	no	Degree completion, degree completion for at risk students, transfer to Four-year institutions, remedial and adult education advancement
Indiana	yes	yes	Completion of credit hours, overall degree change, low income degree student change, on-time degree change, research incentive
Kansas	yes	yes	Each institution creates its own performance agreement
Louisiana	yes	yes	Course completion, STEM degrees, health degrees, research

Table 71 (continued)

States with Performance-Based Funding-2012

States	Used at Two-year Institutions	Used at Four-year Institutions	Performance Indicators
New Mexico	yes	yes	Degree completion, credit completion, STEM degrees, health degrees, degree completion of at risk students
Ohio	yes	yes	Degree completion, credit completion, degree completion of at risk students, STEM degrees
Pennsylvania	no	yes	Degree completion, course completion, student persistence, quality metrics, high risk students, self-developed criteria, diversity metrics
Tennessee	yes	yes	*(both four-year and two-year)* Degree completion, student progression, transfers out with 12 credit hours, quality measures *(four-year)* Research and service, 6-year graduation *(two-year)* dual enrollment, degrees, job placement, remedial/ developmental success, workforce training
Texas	yes	yes	Degree completion for at risk students and critical fields
Washington	yes	no	Gains in basic skills, passing pre-college writing or math, earning 15 credits the first year, earning 30 credits

Note. Adapted from *States' Methods of Funding Higher Education, p. 55, by SRI International, 2012. Retrieved from* http://www.sri.com/sites/default/files/brochures/revised-sri_report_states_methods_of_funding_higher_education.pdf

Appendix B

Table 72

Variable list With Descriptions

Variable	Variable Name	Description	Data Type	Years
INST	Institution Name	Name of the institution	Nominal	N/A
STATE	State	State where the institution is located	Nominal	N/A
x_1	State Appropriations	State appropriations are amounts received by the institution through acts of a state legislative body, except grants and contracts and capital appropriations.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_2	Total Enrollment	Total men and women enrolled for credit in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_3	State Appropriations per Student	This the average state giving per student. This is calculated by dividing the state Appropriations by full-time enrollment.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_4	Percent Admitted Total	Percentage of applicants admitted to an institution for the fall of the academic year.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
x_5	Percentage Receiving Any Financial Aid	Percentage of all full-time, first-time degree/certificate seeking undergraduate students that received any financial aid.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
x_6	Percentage Receiving Federal, State, Local, or Institutional Grant Aid.	Percentage of all full-time, first-time degree/certificate seeking undergraduate students that received any federal, state, local, or institutional grant aid.	Percent	12-13, 11-12, 10-11, 9-10, 8-9

Table 72 (Continued)

Variable list With Descriptions

Variable	Variable Name	Description	Data Type	Years
x_7	Percentage Receiving Pell Grants	Percentage of all full-time, first-time degree/certificate seeking undergraduate students that received the Pell grant.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
x_8	Percentage Receiving Federal Loan Aid	Percentage of all full-time, first-time degree/certificate seeking undergraduate students that received federal student loan aid.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
x_9	Full-time Enrollment	Total men and women enrolled for credit full-time in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_{10}	Total Enrollment Entering Undergraduate Students	Total undergraduate men and women enrolling for credit in the fall of the academic year for the first time.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_{11}	Full-time First-Time Degree Seeking Undergraduate Enrollment	Full-time first-time degree seeking undergraduate men and women enrolled full-time for credit in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_{12}	SAT 25th Percentile Composite Score (Critical Reading Score Plus Math Score)	25th percentile score on the SAT composite score for full-time, first-time degree seeking undergraduate men and women enrolled in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9

Table 72 (continued)

Variable list With Descriptions

Variable	Variable Name	Description	Data Type	Years
x_{13}	SAT 75th Percentile Composite Score (Critical Reading Score Plus Math Score)	75th percentile score on the SAT composite score for full-time, first-time degree seeking undergraduate men and women enrolled in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_{14}	ACT 25th Percentile Composite Score	25th percentile score on the ACT composite score for full-time, first-time degree seeking undergraduate men and women enrolled in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9
x_{15}	ACT 75th Percentile Composite Score	75th percentile score on the ACT composite score for full-time, first-time degree seeking undergraduate men and women enrolled in the fall of the academic year.	Number	12-13, 11-12, 10-11, 9-10, 8-9
y_1	Full-time Retention Rate	The full-time retention rate is the percent of full-time students from the previous fall semester that are still fully enrolled at the institution the following fall semester.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
y_2	Graduation Rate - Total Cohort	Graduation rate (percentage) of first-time, full-time degree or certificate-seeking students that started at the college four to six years before the given year.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
y_3	Graduation Rate Four Year	Graduation rate (percentage) of first-time, full-time degree or certificate-seeking students that started at the college four years before the given year.	Percent	12-13, 11-12, 10-11, 9-10, 8-9
y_4	Graduation Rate Six Year	Graduation rate (percentage) of first-time, full-time degree or certificate-seeking students that started at the college six years before the given year.	Percent	12-13, 11-12, 10-11, 9-10, 8-9

Source: National Center for Education Statistics (NCES) and the Integrated Postsecondary Education Data System (IPEDS)

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

April 23, 2015

MEMORANDUM

TO:	Samuel Fincher Michael T. Miller
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Submission
IRB Protocol #:	15-04-678
Protocol Title:	*An Exploration of Performance-Based Funding at Four Year Public Colleges in the North Central Association of Colleges and Schools*

In reference to the request for IRB approval of your project titled *An Exploration of Performance-Based Funding at Four Year Public Colleges in the North Central Association of Colleges and Schools*, the IRB is not authorized to oversee and approve such research. This protocol does not meet the definition of research involving human subjects in the federal regulations. (See the citation below.) You are free to conduct your research without IRB approval.

45 CFR 46.102 (f)

(f) Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains

(1) Data through intervention or interaction with the individual, or
(2) Identifiable private information.

If you have any questions do not hesitate to contact this office.